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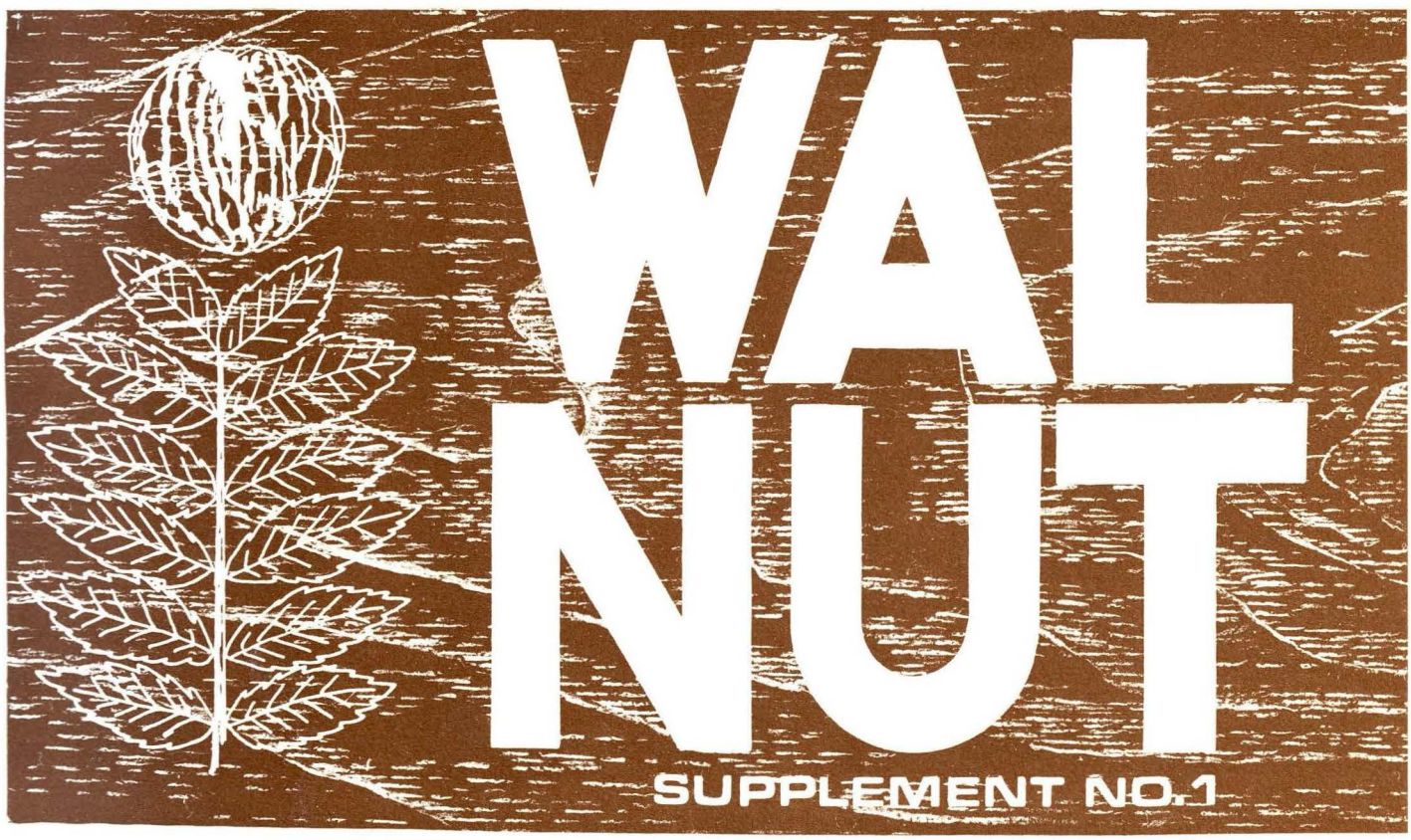
annotated bibliography of



North Central Forest Experiment Station
Forest Service • U.S. Department of Agriculture

FOREWORD

Since publication of "An Annotated Bibliography of Walnut and Related Species," USDA Forest Service Research Paper NC-9, by David T. Funk in 1966, we have accumulated an additional 208 literature references dealing with *Juglans* ecology, silviculture, and timber products. This supplement is an attempt to up-date the previous bibliography, by including citations that were unintentionally omitted in the original publication and those published since 1966.

The bibliography is arranged in alphabetical order by author. An index at the back provides a list of items by subject matter. More than four-fifths of the items are annotated. Most of the remainder were either not seen by the authors or were in a foreign language, with no English summary or translation available.

We would appreciate being notified of any errors in the list and also would be glad to know of any publications that were omitted and should be included in a future supplement.

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ANNOTATED BIBLIOGRAPHY OF WALNUT — SUPPLEMENT NO. 1

Martha K. Dillow and Norman L. Hawker

1. Althen, F. W., von. 1968. INCOMPATIBILITY OF BLACK WALNUT AND RED PINE. Bimon. Res. Notes 24(2): 19.

In a 16-year-old mixed plantation, red pine interplanted with red oak appeared healthy and grew normally, while red pine mixed with black walnut began to die after 15 years; all pine trees mixed with walnut appeared to be sick or dying.

2. Althen, F. W., von. 1971. BLACK POLYETHYLENE MULCH, BEST FOR GERMINATION AND GROWTH OF SEEDED BLACK WALNUT. Bimon. Res. Notes 27(2): 16-17.

Three walnut seeds were seeded in each seed spot. Weed control treatments consisted of (1) mulching with a 3-foot-wide cover of black polyethylene film, (2) mulching with a layer of hardwood sawdust, (3) manual weeding in June and July of the first year, and (4) a single application of 1.5 pounds of active dalapon per acre. Emergence of germinants was earliest and germination was highest in the polyethylene-covered plots. Seedling survival and 5-year growth were also best in these plots. While weed control was fair to good in all plots during the first year, only polyethylene mulch afforded effective control during the second year.

3. Anonymous. 1969. [SPECIAL NUMBER ON JUGLANS REGIA AND OTHER NUT CROPS.] Lesn. Hoz. 2: 2-59. [In Russian.]

A collection of 20 papers covering various aspects of the fruiting, plantation management, and natural stands of Juglans regia in southern U.S.S.R. The most important papers are: Trial thinnings in mixed Juglans regia stands in the forests of Moldavia *(A. I. Golikov) (recommends, on the basis of trials, a first thinning to 1,200-1,600 trees/ha. at age 5-8, completely removing any associate species and shrubs);* Dichogamy and fruiting of Juglans regia *(A. D. Majackaja) (concludes that selection for high nut yield may be made from both protogynous and protandrous trees, but preference should be given to the protogynous trees);* Selection of plus-trees of Juglans regia in the Ukraine *(V. N. Nenjuhin) (describes procedures in selection for fruit yield, frost- and drought-resistance, etc., and study of fruit quality);* Creating Juglans regia plantations on slopes in the central part of the north Caucasus *(E. M. Hričenko) (discusses growth rate as a function of position on terrace);* Varietal seed production and propagation of Juglans regia in Kirghizia *(Ju. I. Nikitinskij); and* Raising Juglans regia in irrigated nurseries *(T. A. Zeltikova) (discusses fertilizer requirements in the production of planting stock in Central Asian nurseries).*

4. Beck, Allan R. 1971. NURSE-NUT GRAFTING. N. Nut Growers Ass. Annu. Rep. 61(1970): 84-90, illus.

Successful nurse-nut grafting of black walnut requires good callus formation on both the understock (nut) and scion. None of the scions rooted, with all new roots emerging from the nurse-nut.

5. Berry, Frederick H. 1966. DISEASE. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 88-90.

Describes diseases that affect black walnut and possible controls.

6. Bey, Calvin F. 1967. OBTAINING GENETICALLY IDENTICAL BLACK WALNUT SEEDLINGS. In Growing black walnuts for nut and timber production. Ill. Quality Nut Tree, Spec. Issue, Part 1, 6(1): 5-8, illus. Ill. Nut Tree Ass., Urbana.

Describes how to split germinating black walnut seeds to obtain genetically identical paired seedlings for research purposes.

7. Bey, Calvin F. 1967. SELECTING OF WALNUT TREES FOR TIMBER. In Growing black walnuts for nut and timber production. Ill.

Quality Nut Tree, Spec. Issue, Part 1, 6(1): 9-12, illus. Ill. Nut Tree Ass., Urbana.

Discusses the two most important characteristics in selecting superior trees for the production of walnut timber: straightness and rapid growth.

8. Bey, Calvin F. 1970. GEOGRAPHIC VARIATION FOR SEED AND SEEDLING CHARACTERS IN BLACK WALNUT. USDA Forest Serv. Res. Note NC-101, 4 p. N. Cent. Forest Exp. Sta., St. Paul, Minn.

Geographic variation in 480 1-year-old families of black walnut was studied. For most characters, the pattern of variation was clinal. Source variation for most characters was from three to five times greater than family variation.

9. Bey, Calvin F., and Funk, David T. 1969. SELECTING AND BREEDING BLACK WALNUT FOR DIVERSE SITES AND TWO INTENSITIES OF CULTURE. Int. Union Forest. Res. Organ., U.N. Food Organ., Second World Consultation Forest Tree Breed., Wash., D.C., Aug. 12, 1969, Sec. 3: 12 p.

A complete black walnut improvement plan should include testing on four cultural intensity-site combinations within each climatic zone. Improved walnut varieties will be bred for rapid growth, strong terminal shoots, straight stems, small branches, insect and disease resistance, and drought hardiness.

10. Bey, Calvin F., and Phares, Robert E. [n.d. Circa 1969]. SEASONAL GROWTH PATTERN FOR FIVE SOURCES OF BLACK WALNUT. Cent. States Forest Tree Improv. Conf. Proc. 6: 44-47, illus.

Height and weight of black walnut seedlings from five sources were measured throughout the growing season. Height growth ceased first, followed by shoot and root dry weight accumulation. Seedlings from southern sources grew taller and accumulated more dry matter than those from northern sources.

11. Bey, Calvin F., Toliver, John R., and Roth, Paul L. 1971. EARLY GROWTH OF BLACK WALNUT TREES FROM TWENTY SEED SOURCES. USDA Forest Serv. Res. Note NC-105, 4 p. N. Cent. Forest Exp. Sta., St. Paul, Minn.

Early results of a black walnut seed source study conducted in southern Illinois suggest that seed should be collected from local or south-of-local areas. Trees from southern sources grew faster and longer than trees from northern sources. Trees from southern sources flushed slightly earlier and held their leaves longer than trees from northern sources. For the 1969 season, height growth rate was best explained by the rainfall pattern. Diameter growth rate was more closely related to air and soil temperatures than to rainfall and soil moisture.

12. Blyth, James E., Kallio, Edwin, and Callahan, John C. 1969. STANDING TIMBER COEFFICIENTS FOR INDIANA WALNUT LOG PRODUCTION. USDA Forest Serv. Res. Pap. NC-33, 9 p., illus. N. Cent. Forest Exp. Sta., St. Paul, Minn.

If the volume of walnut veneer logs and saw logs received at processing plants from Indiana forests is known, conversion factors developed in this paper can be used to determine how much timber was cut to provide these logs and the kinds of timber cut (sawtimber, cull trees, trees on nonforest land, etc.).

13. Boelkins, James N., Everson, Lloyd K., and Auyong, Theodore K. 1968. EFFECTS OF INTRAVENOUS JUGLONE IN THE DOG. Toxicon 6: 99-102, illus.

Juglone was dissolved in an ethanol-glucose mixture and injected intravenously into anesthetized dogs. Histopathologic changes in lungs and liver support the view that juglone is toxic to the cell membrane, increasing capillary permeability.

14. Boesewinkel, F. D., and Bouman, F. 1967. INTEGUMENT INITIATION IN JUGLANS AND PTEROCARYA. Acta bot. neerl. 16(3): 86-101, illus.

A histological study of the initiation and development of the ovule integument in J. regia and P. fraxinifolia.

15. Böhm, H. 1970. [WALNUT PESTS.] ErwObstb. 12: 10-12, illus.

Recommends the following control measures for walnut pests in nurseries: parathion, preferably with a systemic insecticide, for controlling the moth Gracilaria juglandella; sulphur dust, lime-sulphur, or thiodon for the gall mite Eriophyes tristriatus; and phosphoric esters for the damson scale Lecanium corni. Codling moth (Cydia pomonella) infestation of adult trees can only be dealt with by collecting and destroying affected fruits.

16. Bouillot, Jacky. 1968. CONTRIBUTION À L'ÉTUDE DE LA GAMÉTOGENÈSE FEMELLE CHEZ LE JUGLANS REGIA L. (JUGLANDACÉES). Acad. Sci. (Paris) Comptes Rendus 266(D): 1397-1400, illus.

Gamatogenesis of Juglans regia is characterized by its relatively long duration, the occasional presence of excess megosporocytes deep within the nucellus, the customary formation of an embryonic sac from the megaspore micropyle, the delayed fertilization of the polar nucleus, and the production of a male gamete and triploid endosperm.

17. Boyce, S. G., Kaeiser, M., and Bey, C. F. 1970. VARIATIONS OF SOME WOOD FEATURES IN FIVE BLACK WALNUT TREES. Forest Sci. 16(1): 95-100.

Detailed analyses were made of wood samples taken from five black walnut trees grown in southern Illinois. Specific gravity varied with height and distance from the pith. Tangential shrinkage was greater than radial shrinkage and was negatively correlated with the number of vessels. As growth rate increased, specific gravity increased, fiber area increased, vessel lumen size decreased, and number of vessels decreased.

18. Boyer, D. E., et al. 1967. CONTROL OF MISTLETOE, PHORODENDRON FLAVESCENS, ON ENGLISH WALNUTS IN CALIFORNIA. HortScience 2: 10-11.

Clumps of mistletoe 3 to 24 in. in diameter were sprayed with 13 different herbicides all at 10,000 p.p.m. active ingredient together with surfactants at 0.1 percent by volume and oil additions at 6.0 percent to aid penetration of the herbicide into the mistletoe foliage and minimize penetration through the walnut bark. The most satisfactory control 5 years after treatment was obtained with amitrol with X-77 or a dormant emulsive oil, atrazine with dormant emulsive oil, or the isopropyl ester of 2,4-D with Volk oil. Few symptoms of herbicide injury were evident in the host trees.

19. Brauner, A. B., and Loos, W. E. 1968. COLOR CHANGES IN BLACK WALNUT (JUGLANS NIGRA) AS A FUNCTION OF TEMPERATURE, TIME, AND TWO MOISTURE CONDITIONS. Forest Prod. J. 18(5): 29-34.

Saturated sapwood treated at 125° C. closely approached the color of natural heartwood within about 16 hours.

20. Brinkman, Kenneth A. 1966. GROWTH AND YIELD ON PRAIRIE SOILS. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 50-52, illus.

In "cornbelt" black walnut plantations, board-foot volume growth rate was correlated with site quality and yields were influenced by degree of grazing and initial spacing of trees; maximum growth occurred between ages 40 and 50 on the better sites.

21. Byrnes, W. R. 1966. SITE PREPARATION AND WEED CONTROL. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 20-27.

Describes methods for site preparation and weed control in black walnut plantings and their possible results.

22. Calo, Luciana. 1966. [ON THE FLORAL BIOLOGY OF THE WALNUT IN PUGLIA.] Bari. Univ. Fac. Agr. Ann. (It.) 20: 323-342.

Describes morphological characters of different types of walnut buds and flowers and reports results of 2 years of observations on flower biology. These studies were carried out on 275 seedlings. In 1965 protandry and protogyny were observed on 29.4 percent and 31.3 percent of the trees respectively, and in 1966 on 4.4 and 4.0 percent of the trees.

23. Carmean, Willard H. 1966. SOIL AND WATER REQUIREMENTS. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 32-34, illus.

Walnut grows best on deep, loamy, well-aerated soils. Intensive treatment to improve poor sites may be feasible in the future.

24. Černý, L. 1965. [GRAFTING WALNUT AND OTHER WOODY SPECIES DURING THE PERIOD OF TRUE WINTER DORMANCY.] Biol. Plant., Praha 7(3): 226-237, illus. [In German.]

Under favorable conditions--e.g., in a propagating house--during true winter dormancy, damage to the shoots of woody species results in localized elimination of the inhibition of cell division in meristem near the wound, while the rest of the plant still remains dormant. Grafting can thus be done indoors in winter without buds opening on the stock or scions. Photomicrographs are presented of the graft tissue formed with this grafting technique in J. regia.

25. Černý, L. 1969. [A NEW METHOD OF PRODUCING JUGLANS REGIA GRAFTS.] Rost. Vyroba, Praha 15(5): 521-530. [In Czechoslovakian with English summary.]

A detailed, illustrated description of the procedure and equipment developed for large-scale grafting of scions to 1- or 2-year rootstocks indoors during true winter dormancy, without buds opening. The grafts are placed in special heating boxes filled with sterilized sawdust and kept in the greenhouse at 27° C. and high relative humidity for 3 weeks. They are then stored in a cellar, still in boxes and at not less than 0° C., until planting out in the spring. Successful trials made in 1966-1969 with ca. 40,000 plants (including some J. nigra) showed 60 to 70 percent take. Methods used were whip-and-tongue grafts with plastic tubing as binder, and a technique of machine grafting without binding that is to be patented (no details given).

26. Chapelle, A. 1966. [THE TECHNIQUE OF GRAFTING WALNUTS IN THE OPEN.] Rev. Hort.,

Paris 138: 1128-1132, illus.

The methods described include cleft grafting, crown grafting, whip-and-tongue grafting a variation of side grafting known as the Cadillac method, rind grafting, and a combination of rind grafting and budding (using patches of bark bearing dormant buds).

27. Clark, F. Bryan. 1966. INCREMENT BORERS CAUSE SERIOUS DEGRADE IN BLACK WALNUT. J. Forest. 64(12): 814, illus.

Boring black walnut trees causes large wounds and butt-log degrade.

28. Clark, F. Bryan. 1966. CULTURE OF IMMATURE TREES. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 42-46, illus.

Recommends early pruning and release from competition in young black walnut plantations to obtain straight, clear stems and good growth.

29. Clark, F. Bryan. 1967. POLE-SIZED BLACK WALNUT RESPOND QUICKLY TO CROWN RELEASE. J. Forest. 65(6): 406-408, illus.

After 4 years black walnut trees given complete crown release were growing twice as fast as trees not released.

30. Clark, F. Bryan. 1969. FACTORS AFFECTING THE PRODUCTION OF FIBROUS ROOTS ON BLACK WALNUT SEEDLINGS. Dissert. Abstr. 29B(7), (2252).

In a series of greenhouse studies of seedlings of J. nigra, the production of fibrous roots was affected by changes in the moisture and bulk density of the soil, the addition of organic materials, and the soil type. Root initiation was studied in 1-year seedlings planted against glass. Field plantings showed slightly better growth for fibrous-rooted seedlings and seedlings root-pruned in the nursery beds.

31. Clark, F. Bryan. 1969. GROWING BLACK WALNUT TIMBER. In Handbook of North American nut trees. Richard A. Jaynes, Ed., Geneva, New York: W. F. Humphrey Press, Inc. p. 212-223, illus.

Dual crops of nuts and timber are suggested for the black walnut grower. The nut culturist must sacrifice some early nut production to produce at least one 8-1/2-foot log with clear wood to meet minimum industry standards for utilization. Site selection, planting, weed control, spacing, pruning, and harvesting are discussed.

32. Clark, F. Bryan. 1970. MEASURES NECESSARY FOR NATURAL REGENERATION OF OAKS, YELLOW-POPLAR, SWEETGUM, AND BLACK WALNUT. In The silviculture of oaks and associated species. USDA Forest Serv. Res. Pap. NE-144, p. 1-16. Northeast. Forest Exp. Sta., Upper Darby, Penn.

Reports present knowledge of factors needed to regenerate the oaks, yellow-poplar, black walnut, and sweetgum. Concludes that the information now available is sufficient to make substantial improvements in practices to control composition.

33. Clark, F. Bryan. 1971. PLANTING BLACK WALNUT FOR TIMBER. USDA Forest Serv. Leafl. 487 (Rev.), 10 p., illus.

A brief step-by-step description of how to select the site, prepare the planting area, plant the seedlings, and tend the plantation.

34. Condat, G. 1965. [AN INTERESTING EXPERIMENT: THE WALNUT PLANTATION AT SAUZÉ-VAUSSAIS.] Rev. for. franc. 17(7): 525-533. [In French.]

Discusses the declining importance and reduction in numbers of walnut trees on the fringes of the Massif Central, attributable to various factors, including severe storms and frosts in recent years, root diseases, damage by farm machinery, and felling; also describes the establishment in 1960-63 of a new experimental plantation at Sauzé-Vaussais, of selected strains of Juglans regia in mixture with J. nigra, both spot-sown.

35. Cooper, Glenn A., Erickson, Robert W., and Haygreen, John G. 1970. DRYING BEHAVIOR OF PREFROZEN BLACK WALNUT. Forest Prod. J. 20(1): 30-35, illus.

Shrinkage, strain and set development, moisture gradients and drying rate, drying defects, and changes in extractive availability were measured in 2- by 4- by 36-inch surfaced dimension parts of black walnut (Juglans nigra L.) prefrozen at -10°, -100°, and -320° F. Shrinkage in both set-free slices and boards was reduced by prefreezing. Prefreezing apparently had an effect on wood fiber hygroscopicity and shrinkage, and an accompanying effect on board-set development due to altered rheological properties. Drying behavior indicated that much of the effect of prefreezing was dependent on the free-water fraction.

36. Cummins, James N. 1969. SCREEN-GIRDLING OF TRENCH-LAYERED BLACK WALNUT TREES. Plant Propagator 15(4): 17-21.

Gagnon's system of automated girdling was effectively applied using hardware cloth of 3, 4, or 6 mesh per inch to juvenile eastern black walnut seedlings that were trench-layered.

37. Cummins, James N., and Ashby, W. C. 1969. ASEPTIC CULTURE OF JUGLANS NIGRA L. STEM TISSUES. Forest Sci. 15(1): 102-103.
Explants of black walnut stem tissues were cultured aseptically on agar media for 15 weeks. A modified White's medium with vitamin supplement was used, with additional naphthaleneacetic acid (NAA) and kinetin. Transfers of callus did not grow on an auxin-free medium; on NAA-containing medium, growth continued for about a month. No organogenesis was observed.

38. Davis, B., II. 1965. A FURTHER REPORT ON ENGLISH WALNUT BUD DORMANCY. N. Nut Growers Ass. Annu. Rep. 56: 111-114.
When Juglans regia scions were budded on J. nigra rootstocks, the buds survived well but only 20 to 30 percent of them broke into growth the following spring. Out of 15 treatments tested to overcome this problem, promising but inconclusive results were obtained with breaking over the tops of the rootstocks 9 days after budding instead of immediately after budding, and with painting the bud shields with indolebutyric acid (IBA), naphthaleneacetic acid (NAA), or gibberellic acid (GA).

39. David, C. 1968. TO STRATIFY PERSIAN WALNUT SEED. N. Nut Growers Ass. Annu. Rep. 58: 77-78.
Describes two methods: winter stratification by burying nuts in a container, and spring stratification by soaking the nuts in water before sowing.

40. Dawson, R. E., Usher, E. G., Jr., and Mitchell, H. L. 1962. STABILIZED WOOD GUNSTOCKS IN MARINE CORPS MARKSMANSHIP COMPETITION. USDA Forest Prod. Lab. Rep. 2245, 12 p., illus.
Polyethylene glycol treatment of black walnut stocks maintains rifle accuracy under widely fluctuating conditions of service.

41. Day, B. E., Lange, A. H., and Jordan, L. S. 1966. DIURON AND SIMAZINE FOR WEED CONTROL IN WALNUT ORCHARDS. Calif. Agr. Exp. Sta. Ext. Serv. Leafl. 194.
Recommends rates, dates, and methods of herbicide application.

42. Dickson, Richard E. 1970. THE EFFECTS OF SOIL MOISTURE, TEXTURE AND NUTRIENT LEVELS ON THE GROWTH OF BLACK WALNUT (JUGLANS NIGRA L.) UNDER GREENHOUSE CONDITIONS. First N. Amer. Forest Biol. Workshop Abstr. 18.
Black walnut plants were grown from seed in a clay loam and in a sandy soil under two soil moisture regimes and three nutrient levels. Fertilization increased growth only under moist conditions. Under drought conditions, fertilization had no effect in the clay loam soil, but reduced growth in the sandy soil. Without fertilization, seedling growth was greater under moist conditions. These growth differences were accentuated the second growing season, thus indicating the importance of the past environment on the present year's growth of black walnut.

43. Dingle, Richard W. 1952. SURVIVAL AND GROWTH OF FOREST PLANTATIONS IN MISSOURI. J. Forest. 50(11): 845-849, illus.
Black walnut survival averaged only 31 percent; poor site preparation, erosion, and poor plantation care were responsible for much of the loss.

44. Dorodneva, V. I. 1967. [IDENTIFICATION OF THE CAROTENOIDS OF JUGLANS REGIA LEAVES BY SPECTROPHOTOMETRY AND THIN-LAYER CHROMATOGRAPHY.] Rast. Resursy, Moskva 3(2): 266-268. [In Russian.]
β-carotene, lutein, violaxanthin, neoxanthin, flaxoxanthin and cryptoxanthin were identified.

45. Englerth, George H. 1966. MACHINING AND OTHER PROPERTIES OF FAST- VERSUS SLOW-GROWN TREES. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 77-82, illus.
Limited tests on black walnut indicate that wood from fast-grown trees is equal or superior in planing, shaping, and turning qualities to wood from slow-grown trees. Fast-grown material had a higher specific gravity and was tougher.

46. Erdmann, Gayne G. 1966. PLANTING. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 28-31, illus.
Describes methods for planting and direct seeding black walnut in forest plantations.

47. Erdmann, Gayne G. 1967. CHEMICAL WEED CONTROL INCREASES SURVIVAL AND GROWTH IN HARDWOOD PLANTINGS. USDA Forest Serv. Res. Note NC-34, 4 p. N. Cent. Forest Exp. Sta., St. Paul, Minn.
In a plantation of four hardwood species on a silt loam soil planted to 1-0 stock, 4 pounds of active atrazine or simazine controlled weeds effectively without injuring the trees. Chemical weed control was more effective on plowed and disked ground than on unprepared ground. Yellow-poplar and white ash grew faster on prepared ground. Black walnut and red oak did not respond to ground preparation treatments. Guides are presented for proper use of the chemicals in

establishing hardwood plantations.

48. Erdmann, Gayne G., and Green, LeeRoy. 1967. CHEMICAL WEED CONTROL IN A TWO-YEAR-OLD WALNUT PLANTING. USDA Forest Serv. Res. Note NC-28, 4 p. N. Cent. Forest Exp. Sta., St. Paul, Minn.

Six herbicide mixtures were sprayed directly on broadleaf weeds and grasses competing with black walnut trees. Mixtures of paraquat (1/2 pounds/acre) with simazine (4 pounds/acre) or atrazine (4 pounds/acre), and amitrole (2 pounds/acre) plus simazine (4 pounds/acre) gave satisfactory weed control, which resulted in significantly better tree height and diameter growth.

49. Erickson, R. W., Haygreen, J., and Hossfield, R. 1966. DRYING PREFROZEN REDWOOD WITH LIMITED DATA ON OTHER SPECIES. Forest Prod. J. 16(8): 57-65.

Prefreezing samples 1.25 by 2 by 6 inches at -25° C. resulted in decreased shrinkage of redwood, black walnut, black gum, tanoak, golden chinkapin, and rosewood. Prefrozen black walnut also dried faster than controls.

50. Erickson, R. W., and Petersen, H. D. 1969. THE INFLUENCE OF PREFREEZING AND COLD WATER EXTRACTION OF WOOD. Forest Prod. J. 19(4): 53-57.

Prefreezing with dry ice (-79° C.) reduced the radial shrinkage of 4/4 black walnut boards 20 percent, and tangential shrinkage about 10 percent. These reductions developed almost entirely after average moisture content dropped below the fiber saturation point. There was no significant difference in the drying rate and strain patterns of prefrozen and control boards. Prefreezing at -25° C. did not have a significant effect on the shrinkage of 4/4 walnut boards.

51. Farmer, Robert E., Jr. 1971. ROOTING BLACK WALNUT CUTTINGS. Plant Propagator 17 (2): 7-9.

Two-year-old seedlings were lifted from nursery beds in February, planted in loam-filled pots, and pruned back to the root collar. Pots were then placed in a greenhouse dark chamber where etiolated shoots subsequently developed. When shoots were approximately 20 cm. long, some were girdled at the base with copper wire. Several days later, plants were moved to a greenhouse bench where they were grown under 16-hour photoperiods for 1 week prior to making cuttings. When removed from the dark chamber, the bases (4 cm.) of all girdled shoots and some ungirdled shoots were covered with aluminum foil. Apical cuttings were 20 to 30 cm. long with three to four fully expanded leaves; the leaves were pruned to about one-half their original area. Cuttings were dipped in the indolebutyric (IBA)-talc, planted in pots filled with a sand:peat (3:1) medium, and placed under intermittent mist. From 36 to 40 percent of the cuttings rooted.

52. Fayret, J. 1967. NATURAL AND IN VITRO BIOLOGICAL CYCLE OF GNOMONIA LEPTOSTYLA (FR.) CES. AND DE NOT. Acad. Sci. Compt. Rend. Ser. D, 265(13): 908-911. [In French.]

Causal agent of anthracnose on J. regia.

53. Ferell, Raymond S., and Bentley, William R. 1969. PLANTATION INVESTMENT OPPORTUNITIES IN BLACK WALNUT. J. Forest. 67(4): 250-254.

Presents an economic ranking of alternative opportunities for black walnut (Juglans nigra L.) plantation investments in the central hardwood region. The rankings indicate that high sites, thinning, and wide spacing definitely produce higher values. Pruning may also become a more profitable alternative, given probable changes in markets, grading, and technology.

54. Finn, Raymond F. 1966. MINERAL NUTRITION. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 35-41.

Describes the results of several studies of black walnut aimed at eventually determining (1) the amount of available nutrients needed for satisfactory tree growth and development, (2) the foliar deficiency symptoms for each element, and (3) the reactions of a 1-year-old black walnut plantation to applications of nitrogen and phosphorus.

55. Foott, J. H., and Heinicke, D. R. 1967. WHITEWASH FOUND HARMLESS IN APPLICATION ON WALNUT LEAVES. Calif. Agr. 21(3): 2-3.

Whitewash applied to the leaves of Persian walnut trees of the variety Payne to provide shade caused no apparent injury to the leaves and did not interfere with photosynthesis. These studies also indicated that temperatures above 90° F. were very detrimental to photosynthesis and at 95° or above it stopped completely. The application of whitewash to the upper leaf surfaces only resulted in a higher net assimilation rate than application to both surfaces or to the lower surfaces only.

56. Forcy, Andre, Lantelme, J., and Freychet, A. 1965. ESSAIS SUR L'ENRACINEMENT DES BOUTURES DE NOYER. C. R. Acad. Agr. Fr. 51 (18): 1183-1190.

The combination of mist, rooting hormones, and fungicide makes it possible to root a reasonable number of cuttings of black walnut taken from specially prepared seedlings.

However, the transition from rooted cutting to young tree is difficult.

57. Freeman, Eugene E., Jr. 1966. QUALITY REQUIREMENTS FOR SAWLOGS. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 68-71.
Discusses some of the factors that relate to sawlog quality and that affect the value of trees that will be growing in the future.

58. Funk, David T. 1966. SEED ORCHARDS. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 62-65.
Discusses (1) size of black walnut orchards needed to meet the demand of nurseries for seed of improved genetic quality, (2) the number of orchards needed according to climatic zones, (3) site quality requirements, and (4) orchard establishment and management.

59. Funk, David T. 1969. GENETICS OF BLACK WALNUT (JUGLANS NIGRA). USDA Forest Serv. Res. Pap. WO-10, 13 p., illus.
Reviews reproductive development, seed handling and nursery practice, cytogenetics, natural variation, hybridization, and inheritance as they apply to genetic improvement of black walnut. Suggests a breeding program including objectives, selection, mating systems, and seed-orchard design and management.

60. Funk, David T. 1971. POT SIZE, POT SHAPE, AND SOIL MIX ALL INFLUENCE BLACK WALNUT SEEDLING GROWTH. Plant Propagator 17(1): 10-14.
For black walnut seedlings grown in pots for one season in the greenhouse, height, shoot weight, and especially root weight were strongly dependent on pot volume. In conventionally shaped pots, seedlings grew taller when a soil mix containing three parts fine sand to one part ground peat was used; when grown in containers about three times as tall as wide, taller seedlings were produced when the pots were filled with equal parts of sand and peat. Walnut seedlings grown in conventionally shaped pots containing the 3:1 sand-peat mix had about 40 percent greater shoot:root ratio than those grown in other pot-soil mix combinations.

61. Gagnaire, J., and Vallier, C. 1968. [VARIATIONS IN THE POTASSIUM CONTENT OF LEAVES OF GRAFTED WALNUTS, JUGLANS REGIA ON J. NIGRA, GROWN UNDER NATURAL CONDITIONS.] C. R. Acad. Agr. Fr. 54: 81-86. [In French.]
Presents data on variations in the K content of the leaf and fruit during July-October 1967 in walnut (J. regia cv. 'Franquette') grafted on J. regia and J. nigra. The ages of the trees studied ranged from 6 to 100 years. The foliar K content in the J. regia/J. nigra combination was consistently lower in trees over 30 years old and suffering from the black line disorder than in younger trees. It was also lower than in J. regia/J. regia trees of the same age or older. The K content of the whole fruit was high (over 20 g. percent dry matter) in all types of trees in July and August; it decreased markedly in September in fruit of J. regia/J. nigra only.

62. Gerasimenko, A. G. 1967. THE BIOLOGY OF FLOWERING AS A BASIS FOR WALNUT SEED PRODUCTION. In Conf. on Forest-Tree Genetics, Selection, and Seed Production. (Edited by G. M. Kozubov, et al.) Clearinghouse for Federal Scientific and Technical Information, Springfield, Va., TT 69-55067. p. 136-137.
Flowering phenology as related to dichogamy.

63. Gervais, Camille. 1963. UN NOUVEL HYBRIDE NATUREL CHEZ JUGLANS. Ann. Ass. Canad. Franc. Avance. Sci. 29: p. 45.
Describes a putative J. nigra x J. cinerea hybrid.

64. Gesto, M. D. V., Vazquez, A., Mendez, J., Vieitez, E., and Seoane, E. 1967. GROWTH SUBSTANCES ISOLATED FROM WOODY CUTTINGS OF QUERCUS ROBUR L. AND JUGLANS REGIA L. Rep. from P. L. 480 Project E25-FS-16, 14 p., illus.
Describes a study of growth substances in Juglans regia L. made by extraction with methanol, paper and thin layer chromatography, ultraviolet and flourescence spectroscopy, and Avena coleoptile straight growth test. From J. regia vanillic, syringic and three other not yet identified acids (one close to p-coumaric, one similar to salicylic and the other an inhibiting hydroxyaliphatic acid) were isolated and studied in their growth properties.

65. Gibson, M. D. 1968. THE MANREGIAN WALNUT. N. Nut Growers Ass. Annu. Rep. 58: 105-109.
Describes the history and origin of this clone of Juglans regia from a tree in China and the performances of its sibs in Oregon and elsewhere. Winter hardiness genes are carried by Manregian forms, and it is thought that very winter-hardy trees could be obtained by crosses involving varieties of Carpathian or German descent, which are even hardier than Manregian forms.

66. Gilbert, Barry, L., Baker, James E., and Norris, Dale M. 1967. JUGLONE (5-HYDROXY-1, 4-NAPHTHOQUINONE) FROM CARYA OVATA, A DETERRENT TO FEEDING BY SCOLYTUS MULTISTRIATUS. J. Insect Physiol. 13: 1453-1459.
Not seen.

67. Gilyarov, M. S. 1949. [THE NOXIOUS SOIL FAUNA OF WALNUT FORESTS OF KIRGHIZIA.] Tr. Yuzhno-Kirg. Eksp. Akad. Nauk SSSR, Vol. 1. [In Russian.]
Not seen.

68. Glenn, E. M. 1965. INCOMPATIBILITY IN THE WALNUT. East Malling Res. Sta. Annu. Rep. 53: p. 102.
Describes three cases of delayed incompatibility of Juglans regia grafted on J. nigra.

69. Graves, David L. 1966. GRAFTING OF WALNUTS. Int. Plant Propagators Soc. Proc. 15: 281-284.
In northern California, Juglans regia scions are grafted onto 1-year seedling rootstocks of at least 1/2-inch caliper. Scions are cut from dormant 1-year-old wood in January and February, using only the more mature basal portion of the shoot; the wood is held in storage at 33° to 35° F. Stock plants are cut back to 16 to 18 inches about March 1 and allowed to "dry out" for 10 to 14 days, then cut back another 1 to 2 inches and whip grafted. Two or three cuts are made at the base of the stock to allow premature sap flow to escape.

70. Green, R. J., Jr., and Pratt, R. G. 1970. ROOT ROT OF BLACK WALNUT SEEDLINGS CAUSED BY PHYTOPHTHORA CITRICOLA. Plant Disease Reporter 54(7): 583-585, illus.
Describes a serious root rot disease of black walnut seedlings in a State tree nursery caused by Phytophthora citricola. This disease also occurs on at least two species of oaks, but is much less severe. Black walnut seedlings are usually infected in the seedbed, where young seedlings are usually killed, or infection may continue to develop in overwinter storage and cause losses in the spring during handling and shipping. Soil moisture is critical for infection and the disease is usually more severe after periods of heavy rain or high soil moisture levels.

71. Grente, J., and Averseng, P.-J. 1966. [A SOLUTION TO THE PROBLEM OF WALNUT DECLINE. I. ADVANTAGES AND DISADVANTAGES OF JUGLANS NIGRA.] C. R. Acad. Agr. Fr. 52: 553-560.
The advantages of using J. nigra rather than J. regia as a rootstock for walnuts include resistance to Armillaria and Phytophthora cinnamomi, easy grafting, smaller, more manageable trees, probably larger nuts, and earlier fruit (5 to 6 years after grafting). The chief disadvantage is the occurrence of black line, caused by a loss of affinity between stock and scion after about 30 years. Juglans nigra will not grow successfully in a poor or badly drained soil or in very dry situations, but on the whole is considered preferable to regia.

72. Griggs, William H., Forde, Harold I., Iwakiri, Ben T., and Asay, Richard N. 1971. EFFECT OF SUBFREEZING TEMPERATURE ON THE VIABILITY OF PERSIAN WALNUT POLLEN. HortScience 6(3): 235-237.
Viability of walnut (Juglans regia L.) pollen was not diminished by storage at subfreezing temperature, as previously indicated. Pollen stored 20 days at -19° C. effected high percentages of fruit set in the orchard in 1969. Fruit set of the bagged flowers was relatively low in 1970, but the set effected by pollen stored a year at -19° C. was not significantly different from that effected by fresh pollen. Laboratory tests indicated less than 1 percent germination for both freshly dehisced and stored pollen, and were unreliable for indicating the ability of walnut pollen to effect fertilization.

73. Grishin, Yu. F. 1966. [THE USE OF PERSIAN WALNUT IN PROTECTIVE AFFORESTATION.] Sadov. Vinogradarstvo Vinodelie Moldavii 9: 11-13. [In Russian.]
Not seen.

74. Hacskaylo, J., Finn, R. F., and Vimmerstedt, J. P. 1969. DEFICIENCY SYMPTOMS OF SOME FOREST TREES. Ohio Agr. Res. & Develop. Center Res. Bull. 1015, 68 p., illus.
Describes and illustrates appearance of black walnut, black locust, cottonwood, and sweetgum leaves from plants grown in nutrient solutions deficient in a single essential element. Includes abbreviated tables of chemical analyses comparing the concentration of the deficient element in the leaves, stems, and roots of the plants grown in nutrient-deficient and complete nutrient solutions.

75. Hall, Geraldine C., and Farmer, Robert E., Jr. 1970. "IN VITRO" GERMINATION OF BLACK WALNUT (JUGLANS NIGRA L.) POLLEN. First North American Forest Biology Workshop Abst. p. 20.
Black walnut pollen was germinated on liquid and agar-based media containing 20-percent sucrose. Boron slightly enhanced germination. Germination occurred only in dense (150 grains/mm.^{2}) populations of pollen on the agar medium. Germination in the sparse areas was promoted by high boron concentrations (300 to 600 p.p.m. boric acid). Wide tree-to-tree variation in germination percent was observed. Vacuum-drying periods, ranging from 5 to 60 minutes, resulted in a gradual reduction of viability. Complete loss of viability occurred after drying for 30 minutes.

Pollen was stored at 4° C., -30° C., and -196° C. for several weeks without major loss of viability.

76. Hall, Geraldine C., and Farmer, Robert E., Jr. 1971. IN VITRO GERMINATION OF BLACK WALNUT POLLEN. Can. J. Bot. 49(6): 799-802.
Black walnut pollen was germinated on liquid and agar-based media containing 20-percent sucrose, a requirement for germination and normal tube development. Boron (100 p.p.m. boric acid) added to this medium slightly enhanced germination. Germination occurred only in dense (150+ grains/mm.^{2}) populations of pollen on the agar medium. This population effect was not overcome by the addition of Ca^{2+} to the medium, but germination in the sparse areas (<30 grains/mm.^{2}) was occasionally promoted by high boron concentration (600 p.p.m. boric acid). Wide tree-to-tree variation in percentage of germination was observed. Vacuum-drying periods, ranging from 5 to 30 minutes, resulted in a gradual reduction of viability. Pollen was stored at -30° C. and -196° C. for 3 months without major loss of viability.

77. Hart, J. H. 1965. FORMATION OF DISCOLORED SAPWOOD IN THREE SPECIES OF HARDWOODS. Mich. Quart. Bull. 48(1): 101-116.
Sapwood, heartwood, and discolored sapwood were compared to determine if sapwood is transformed into heartwood upon wounding. An increment borer was used to induce discolored sapwood in white oak, Quercus alba L., silver maple, Acer saccharinum L., and black walnut, Juglans nigra L. Whereas discolored sapwood in the three species studied was morphologically similar to but not identical to normal heartwood, it was, from a chemical standpoint, much different and should not be considered a precocious development of normal heartwood.

78. Hay, C. John, and Donley, David E. 1966. INSECTS PESTS. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 83-87.
Covers 17 of the more important insects and mites of Juglans nigra L. and J. cinerea L. in groups by type of injury.

79. Heffernan, T. 1967. OXYDEMETRONMETHYL IMPLANTED TO ENGLISH WALNUTS FOR CONTROL OF WALNUT APHID (CHROMAPHIS JUGLANDICOLA). J. Econ. Entomol. 60(3): 890-891.
Injections of demetron successfully controlled aphids resistant to foliar spray.

80. Hendricks, L. C., Jr., Davis, C. S., and Batiste, W. C. 1968. TWO-SPOTTED MITE CONTROL IN WALNUTS. Calif. Agr. 22(6): 12-13.
Omite EC was the most effective acaricide in Merced County, California, trials to control Tetranychus urticae.

81. Henniger, C. N., and Bolar, Max D. 1966. PLANTING BLACK WALNUTS IN TIN CANS. USDA Forest Serv. Tree Planters' Notes 76: 13-14, illus.
The method is recommended to protect direct-seeded nuts from rodent depredation.

82. Herrera Atter, S. 1968. [ROOT ROT IN SEEDLINGS OF PINUS RADIATA, PSEUDOTSUGA MENZIESII AND JUGLANS NIGRA.] Inst. Forest Latinoamer. Invest. Capacitacion. Bol. 26: 33-38. [In Spanish with English summary.]
Caused by Fusarium sp. fungus, in Venezuela.

83. Herrmann, K. 1955. ÜBER DIE FLAVONOLE DER BLÄTTER VON JUGLANS REGIA L. Archiv. Pharm. (Berl.) 288(8/9): 362-364.
Two glycosides, quercetin-3-galactoside and quercetin-3-arabinoside, predominate in English walnut leaves.

84. Houda, J. 1966. [VISCUM ALBUM IN JUGLANS NIGRA.] Ziva 14(4): p. 136. [In Czechoslovakian.]
Not seen.

85. Impiumi, G. and Ramina, A. 1967. [STUDIES ON FLORAL BIOLOGY AND FRUITING IN WALNUTS (JUGLANS REGIA). I. OBSERVATIONS ON FLORAL MORPHOLOGY AND POLLEN TRANSFERENCE.] Riv. Ortoflorofruttic. 51: 538-543, illus. [In Italian with English summary.]
Describes the techniques utilized for assessing pollen transmission. Pollen production averaged about 900 grains per anther and about 1,800,000 per catkin. The number of anthers per flower averaged about 18 at the stalk end and 13 at the tip of the catkin. Much pollen was collected at a distance of 160 m. from the nearest tree.

86. Jacoboni, Nestore. 1959. RICHERCHE SULLA BIOLOGIA FIORALE E DI FRUTTIFICAZIONE DEL NOCE (JUGLANS REGIA, LINN.) IN UMBRIA. Ann. Fac. Agr. Perugia 14: 116-140, illus. [In Italian.]
Describes pollen, flower, and fruit morphology from the taxonomic standpoint. Many photos.

87. Jovanović, B. 1967. [PHENOLOGY OF JUGLANS REGIA, ROBINIA PSEUDOACACIA AND SYRINGA VULGARIS IN DIFFERENT PARTS OF JUGOSLAVIA IN 1952-1961.] Šumarstvo 20 (9/10): 3-20. [In Serbian with French summary.]
Not seen.

88. Kavetskaya, G. A. 1966. [ACCUMULATION OF NUTRIENT SUBSTANCES IN THE PROCESS OF DEVELOPMENT OF ENGLISH WALNUT (JUGLANS REGIA L.) SEEDS.] Ukr. Bot. Z. 23(6): 44-49. [In Ukranian with English summary.]

Fertilized embryo sacs appear on the 6th day after pollination. The cellular endosperm forms on the 16th day after pollination. In the mature seed only one peripheral layer of cells is left of the endosperm. The germ cell divides obliquely transversely into two unequal cells on the 10th to 13th day. Both cells participate in the formation of the embryo. In the mature seed the endosperm and embryo contain fat and aleurones; starch is found only in the young embryo. In the parenchymal layer of the forming seed coat, starch and fat are found, as well as tannic substances. In the coat of the mature seed the reserve substances vanish, while tannic substances are found in the obliterated parenchymal layer.

89. Kenig, A. E. 1966. [INTERACTION OF WALNUT ROOT SYSTEM WITH OTHER SPECIES OF FOREST STANDS IN THE UKRAINE.] Visn. Sil's'kohospod. Nauk. 5:91-95. [In Ukranian with Russian summary.]

Not seen.

90. Kenig, A. E. 1967. [SOME RESULTS IN THE INTRODUCTION OF JUGLANS NIGRA INTO THE UKRAINE.] Ukr. Bot. Z. 24(1): 81-87. [In Ukranian.]

Maps the distribution of J. nigra in the Ukraine, with data on age (23 to 100 years), numbers of trees, dimensions, and fruiting; concludes that it is a suitable species for this region, being quite fast-growing and winter-hardy, and usually fruiting well.

91. Kolobkova, E. V. 1968. [THE CONTENT OF NITROGENOUS SUBSTANCES IN THE SEEDS OF JUGLANDACEAE.] Bjull. Glavn. Bot. Sada, Moskva 68: 63-68. [In Russian.]

The total N content was determined in the seeds of 28 species belonging to six genera (Juglans, Carya, Pterocarya, Platycarya, Cyclocarya, and Engelhardtia). Each genus had a characteristic N content. Evolutionary inferences are discussed.

92. Koma, S. 1951. [GROWTH OF THE WALNUT FRUIT AND THE CHANGE OF CHEMICAL COMPOSITION IN ITS KERNEL.] Hort. Ass. Japan J. (Tokyo) 20: 134-136. [In Japanese with English summary.]

Fruit development of Juglans sieboldiana and J. regia orientalis was studied at 2-week intervals. Fruits increased in size chiefly within 6 weeks after flowering, while they increased in weight within 9 to 10 weeks after flowering. The soluble nonnitrogen substances in the kernel, which were abundant at the earlier stage, decreased gradually with fruit growth, but fat increased rapidly after the fruit reached maximum weight. Protein increased gradually until the end of growth.

93. Komanič, I. G. 1966. [CHARACTERISTICS OF WALNUT GRAFTING.] Izv. Akad. Naulk Mold. SSR, Ser. viol. him. Nauk 7: 30-35. [In Russian.]

In greenhouse walnut grafting, optimum conditions for callus formation and union were a temperature of 25° to 27° C. and a relative humidity of 70 to 80 percent. Temperature fluctuations between 15 and 32° C. and a short-term reduction of the relative humidity to 40 percent did not reduce graft take markedly. A sharp drop in temperature below 10 to 15° C. greatly reduced take.

94. Krajicek, John E. 1966. GROWING SPACE REQUIREMENTS. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 47-49.

Discusses the pros and cons of planting walnut at wide and narrow spacings. Suggests an alternative method involving mixed plantings and thinnings that exploits the advantages of both wide and narrow spacing.

95. Krajicek, John E. 1969. WEED CONTROL IN BLACK WALNUT PLANTINGS. N. Nut Growers Ass. Annu. Rep. 60: 30-35, illus.

Controlling weed competition is essential to the successful establishment of black walnut plantings. Chemical control has been found superior to mechanical control. Methods of weed control, formulation for an all-purpose herbicide, application rates and times, and methods of application are discussed.

96. Krajicek, John E., and Bey, Calvin F. 1969. HOW TO "TRAIN" BLACK WALNUT SEEDLINGS. USDA Forest Serv., N. Cent. Forest Exp. Sta. 5 p., illus.

Describes and shows how to prune black walnut seedlings planted for timber production.

97. Krajicek, John E., and Phares, Robert E. 1971. HOW TO CONTROL WEEDS IN BLACK WALNUT PLANTINGS. USDA Forest Serv. Leafl., 8 p. N. Cent. Forest Exp. Sta., St. Paul, Minn.

Provides up-to-date recommendations on use of pre-emergent herbicides and mechanical methods for controlling weeds in black walnut plantings. Also presents safety precautions in using herbicides.

98. Krasil'nikov, P. I. 1949. [ROOT SYSTEMS IN WALNUT.] Tr. Yuzhno-Kirg. Eksp. Akad. Nauk SSSR. Vol. 1. [In Russian.]

Not seen.

99. Kulov, K. D., and Tikoev, M. A. 1966. [JUGLANS REGIA IN NORTHERN OSSETIA.] Les. Hoz. 19(6): 17-22. [In Russian.]
Tabulates data on growth and nut yield up to 9 years in this part of the N. Caucasus. J. regia did best on leached chernozem and on north slopes. On rich, deep chernozems and alluvial soils, spacing should be 12 by 12 m., with interplanting of bush fruits on dwarf stocks. On dark-grey forest soils and other less rich soils, the spacing should be 8 by 8 or 10 by 10 m., and Cydonia oblonga, Prunus persica, P. divaricata, etc., could be interplanted.

100. Lange, A. H., Crane, J. C., Fischer, W. B., Roberts, K. O., and Elmore, C. L. 1969. PRE-EMERGENCE WEED CONTROL IN YOUNG DECIDUOUS FRUIT TREES. J. Amer. Soc. Hort. Sci. 94(1): 57-60.
On clay loam soil with 6 percent organic matter, simazine, diuron, and prometryne applied at 4 pounds per acre provided good weed control without damaging 1/2-inch caliper 'California' black walnut (J. hindsii?) seedlings. On coarse, sandy soil with only 0.6 percent organic matter, simazine and diuron at 1 pound per acre controlled weeds well without harm to walnut transplants; higher rates and other herbicides, especially Bromacil, damaged the walnuts.

101. Lange, A. H., Day, B. E., Jordon, L. S., and Russell, R. C. 1967. PRE-EMERGENCE HERBICIDES FOR WEED CONTROL IN WALNUTS. Calif. Agr. 21(1): 2-4.
Diuron and simazine were field tested in California's major walnut producing districts. Tests were continued at three locations for 2 years and at one location for 3 years. Simazine and diuron in the range of 2 to 4 pounds/acre resulted in greater than 90 percent weed control. Both herbicides were generally more effective in southern California than in the northern areas. Diuron can injure walnut trees on some sandy soils and should be used only in established plantations.

102. LaPorte, Juan. 1966. NUMEROS CROMOSÓMICOS Y ALGUNAS OBSERVACIONES BIOLOGICAS SOBRE TRES ESPECIES AMERICANAS DEL GÉNERO JUGLANS. [CHROMOSOME NUMBERS AND OTHER BIOLOGICAL OBSERVATIONS ON 3 AMERICAN SPECIES OF THE GENUS JUGLANS.] Darwiniana 14(1): 156-160, illus.
The chromosome number of both J. australis and J. boliviana is n = 16.

103. Lebedinova, N. S. 1968. [THE MOISTURE REGIME OF DARK-BROWN SOILS UNDER THE CANOPY OF DIFFERENT TYPES OF JUGLANS REGIA FORESTS IN FERGANA (SOVIET CENTRAL ASIA).] Pcovoved. 1: 32-41. [In Russian.]
Distinguishes four main categories of sites: (1) where part of the precipitation is lost as run-off--site class never better than IV; (2) where inflow equals run-off--site class III to IV; (3) where inflow exceeds run-off--site class II; and (4) where there is a slow and continuous accession of moisture to the surface, but at a rate that does not cause waterlogging--site class I.

104. Lee, K. C., and Campbell, R. W. 1969. NATURE AND OCCURRENCE OF JUGLONE IN JUGLANS NIGRA L. HortScience 4(4): 297-298.
Seems probable that the toxic juglone comes from both the above and underground part of black walnut trees, although juglone toxicity as suggested by MacDaniels et al. is controlled by multiple factors rather than by concentration alone.

105. Lindmark, Ronald D., and DeBald, Paul S. 1969. BLACK WALNUT ON NONFOREST LAND IN KENTUCKY. USDA Forest Serv., Res. Bull. NC-16, 18 p., illus. Northeast. Forest Exp. Sta., Upper Darby, Penn.
A report of a survey of black walnut timber found on nonforest land in Kentucky. These trees add substantially to the State's overall supply of black walnut. Although the trees growing under nonforest conditions tend to be short-boled, many of them have large diameters and contain quality timber.

106. Link, H. 1961. [INFORMATION ON THE FLOWER BIOLOGY OF THE WALNUT TREE, JUGLANS REGIA.] Diss. Landw. Hochsch., Hohenheim, 78 p., illus. [In German.]
The vigor of the test trees (four walnut seedlings) differed and was affected by environmental factors such as late frost. The optimal shoot length for the formation of male flowers was 5 to 25 cm. and for female flowers 15 cm. and above. The relative male:female inflorescence ratio of each tree changed with increasing vegetative development in favor of the female; combined with this was a reduction in the total inflorescence number.

107. Losche, Craig K. [n.d. Circa 1970]. WALNUT SITE SELECTION AND SOIL MANAGEMENT. Northeast. Area Nurserymen's Conf. Proc., Carbondale, Ill., Aug. 20-21, 1969: 55-58.
Discusses the relation of height and diameter growth of plantation-grown black walnut on floodplains of southern Illinois to the thickness of silty soil material over a chert gravel layer and the depth to mottling. Also discusses the relation of

soil properties to various cultural operations in plantations.

108. Lowe, William J., and Beineke, Walter F. 1969. COMPARING GRAFTING TECHNIQUES FOR BLACK WALNUT. South. Conf. Forest Tree Impr. Proc. 10: 231-235.

The bark inlay technique is the most appropriate method to use when the root stock has sufficient diameter (greater than 1 inch at grafting point). When a smaller-sized root stock (less than 1 inch at grafting point) is used, the cleft graft gives satisfactory results. Either method produces a satisfactory percentage of successes to be used in the establishment of black walnut seed orchards. Whip grafting, T-budding, and patch budding were totally unsuccessful under the conditions of this investigation.

109. Lur'e, I. G. 1952. [REPLACEMENT OF TRANSPLANTATION BY SOWING OF GERMINATED SEEDS WITH PRUNING OF THE RADICLE.] Sad i Ogorod, No. 2. [In Russian.]

Not seen.

110. McDaniel, J. C. 1969. OUTLINE OF NUT TREE POLLINATION. N. Nut Growers Ass. Annu. Rep. 59: 51-55.

Most interspecific walnut hybrids having Juglans regia as one parent shed little or no viable pollen. Some hybrid walnuts also have a high degree of female sterility. Extremely early or late female flowers are often poorly pollinated.

111. McGinnes, E. A. 1968. EXTENT OF SHAKE IN BLACK WALNUT (JUGLANS NIGRA). Forest Prod. J. 18(5): 80-82.

Shake was found in 4.3 percent of more than 10,000 butt logs examined in Missouri, with ring and wind shake being most common.

112. McKay, J. W. 1967. LATE-FLOWERING WALNUT HYBRIDS. N. Nut Growers Ass. Annu. Rep. 57(1966): 70-75.

Five Juglans regia x J. nigra hybrids produced in 1940 flower late and are virtually immune from damage by late frosts. One hybrid is late in spring growth but its nuts mature early. The hybrids show marked heterosis.

113. McKay, J. W. 1966. VEGETATIVE PROPAGATION. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 58-61.

Describes grafting and budding techniques used in growing black walnut trees for nut production.

114. Maeglin, R. R., and Nelson, N. D. 1970. SURFACE SOIL PROPERTIES OF BLACK WALNUT SITES IN RELATIONSHIP TO WOOD COLOR. Soil Sci. Soc. Amer. Proc. 34(1): 142-146.

Various soils that supported black walnut in Indiana and Missouri were analyzed for surface pH, organic matter, available P, exchangeable K, Ca, Mg, total N, silt plus clay content, cation-exchange capacity (CEC), and depth to mottling or to impervious layer. Quantitative color values of heartwood of walnut trees grown on these soils were determined by reflectance spectroscopy. The soil properties analyzed were moderate to high for most soils studied. The range of observed site quality was rather limited; however, poor sites showed a tendency toward darker, redder heartwood.

115. Majackaja, A. D. 1969. [DICHOGAMY AND FRUITING IN WALNUTS.] Les. Hoz. 2: 32-35. [In Russian.]

Of 1,024 fruiting walnut trees studied, 52 percent were protogynous and 48 percent protandrous. The type of dichogamy in the same tree did not change with time. The flowering period of male and female flowers on protogynous trees was longer than on protandrous trees, and this created better conditions for fertilization. The productivity of protogynous trees was 10 to 15 percent higher than that of protandrous trees.

116. Manning, Wayne E. 1957. A BOLIVIAN WALNUT FROM PERU GROWING IN COSTA RICA. Brittonia 9(2): p. 131.

Identified as Juglans boliviana. The nuts, sown in Costa Rica in 1948, were collected in Peru.

117. Marking, L. L. 1970. JUGLONE AS A FISH TOXICANT. T. Am. Fish. Soc. 99(3): 510-514.

Juglone, a biologically active chemical occurring in various parts of walnut trees, was tested for its toxicity to fish. The 96-hour LC50 values obtained from static bioassays at 12° C. ranged from 27 to 88 parts per billion for rainbow trout, northern pike, goldfish, carp, white suckers, black bullheads, channel catfish, green sunfish, and bluegills. The toxicity of juglone to rainbow trout and bluegills was not altered significantly in water of different temperature or hardness. Standard (pH 7.4) and buffered (pH 9.0) solutions of juglone aged for 1 week effectively killed rainbow trout although approximately three times as much juglone was required at the higher pH. According to other investigators, juglone is easily reduced to less toxic components by factors in the natural environment. However, juglone is sufficiently persistent to eliminate target fish prior to its degradation.

118. Martin, C. G., Mason, M. I. R., and Forde, H. I. 1969. CHANGES IN ENDOGENOUS GROWTH SUBSTANCES IN THE EMBRYOS OF JUGLANS REGIA DURING STRATIFICATION. J. Amer. Soc. Hort. Sci. 94(1): 13-17.

No cytokinins or gibberellins were found, but an inhibitor believed to be abscisic acid, which decreased in concentration during stratification, was isolated.

119. Mathers, Robert. 1966. QUALITY REQUIREMENTS FOR VENEER. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 66-67.

Walnut growers should produce veneer logs at least 14 inches in diameter (at small end) and free of serious defects for at least one 8-1/2-foot log. Time of year is important. Tells how to minimize danger of stains and splits or checks due to summer harvest.

120. Maurer, K. J. 1967. [PROBLEMS OF AFFINITY AND UNION IN WALNUT GRAFTING.] Mitt. Klosterneuburg 17: 481-491, illus. [In German with English, Spanish, and French summaries.]

Graft compatibility in walnuts depends not only on the species of seedling rootstock chosen, but also on the clone or source of the seed parent. Describes symptoms of incompatibility, which are visible only along the grafting cuts and are not usually apparent externally.

121. Maurer, K. J. 1969. [WALNUTS GRAFTED IN THE OPEN GROWN WITHOUT A SNAG ON THE ROOTSTOCK.] Mitt. Klosterneuburg 19: 313-314, illus. [In German with English, Spanish, and French summaries.]

Describes a method whereby the snag that is normally left on the rootstock is cut back before the graft starts into growth, and the graft is bound immediately to a stake; the wound then heals during the first year.

122. Mazur, O. P. 1965. [THE EFFECT OF SOIL MOISTURE AND MINERAL SUBSTANCES ON THE INTENSITY OF ENDOTROPHIC MYCORRHIZA FORMATION IN WALNUTS (JUGLANS REGIA).] Dokl. Akad. Nauk. tadz. SSSR. 8(10): 44-48. [In Russian with Tadzik summary.]

In soil culture experiments with 1-year-old walnut seedlings, forest soil from walnut stands was added to each container and maintained at 25, 40, 55, and 70 percent water-holding capacity. Mycorrhizae developed best at 40 to 50 percent moisture content, and seedling development (foliation, height, stem diameter, and root system) was positively related to the intensity of mycorrhizae formation.

123. Meza, N. 1968. [PROSPECTIVE WALNUT HYBRIDS.] An. Inst. Cerc. Pomicult., Pitesti 1: 65-75, illus. [English, French, German, and Russian summaries.]

Three hybrids resistant to Xanthomonas juglandis, Gnomonia leptostyla and low temperature were selected from breeding experiments conducted between 1958 and 1967. They bear early and are very productive. Other fruit characteristics are described.

124. Mikhaleva, E. N., and Konovalov, I. N. 1967. [ON THE PHYSIOLOGICAL HETEROGENEITY OF SHOOTS IN THE PERSIAN WALNUT.] Akad. Nauk. SSSR. Bot. Inst. Tr. Ser. 4, Eksp. Bot. 19: 206-215. [In Russian with English summary.]

The 1-year-old shoots of Persian walnut (Juglans regia L.), differing in their growth characteristics and location in the tree crown, are characterized by the different level of physiological processes (the rate of growth, photosynthesis and respiration, the content of carbohydrates).

125. Minovski, D. 1967. [THE EFFECT OF TIME AND METHOD OF WALNUT GRAFTING ON ITS SUCCESS IN SKOPJE.] Annu. Fac. Agr. Sylvic. Skopje, Agr. 20: 147-159, illus.

In seedling rootstock production, stratified nuts gave 68 percent germination compared with 20 percent for unstratified nuts. Cleft grafting with active scions and cleft grafting with dormant scions gave the best results. As rootstocks, 1- to 2-year-old Juglans regia should be used; J. nigra gave poor results.

126. Mitchell, H. L. 1960. NEW ANTISHRINK TREATMENT IMPROVES WOOD FOR GUNSTOCKS, OTHER USES. Wood & Wood Prod. 65(11): p. 50, 52, 102.

Polyethylene glycol treatment.

127. Mitchell, H. L. 1963. PEG-TREATED WALNUT LIMBWOOD MAKES HANDSOME DECORATOR CLOCKS. Forest Prod. J. 13(9): 416, illus.

Gives directions for stabilizing and curing disks cut from waste walnut limbwood. The disks are suitable for mounting clock movements and for making other specialty items.

128. Mitchell, H. L. 1966. PROFITABLE USE OF LOW-GRADE TIMBER. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 72-76.

Discusses products and processes which could contribute to much closer utilization of available raw material now largely wasted. Discusses some specialized, high-value products that can be profitably produced from sawmill and logging residue.

129. Mittempergher, L. 1969. [A NEW METHOD OF GRAFTING WALNUTS IN THE NURSERY.] Riv. Ortoflorofruttic. 53: 189-202, illus. [In Italian with English summary.]

This method of cleft grafting was delayed until the latter half of May to ensure a minimum temperature of 10° C. and an average temperature of 18 to 20° C. Dormant stocks and scions were stored at 2 to 3° and almost 100 percent relative humidity from the end of February. Juglans nigra and J. regia seedling walnuts were grafted with several walnut varieties, the stock being well-rooted and equal in diameter to the scions. The gradual reduction of shade was necessary for 6 weeks after grafting. With 480 grafts, successes reached 81.7 percent in spite of some of the scions being below standard. The only disadvantage of the method is the limited growth and ripening of the grafted plant in the first year.

130. Momot, N. M. 1940. [WALNUTS AND ASSOCIATED SPECIES IN SOUTHERN KAZAKHSTAN.] Vses. Nauch. Issled. Inst. Sukhikh Subtrop. [In Russian.]

Not seen.

131. Moore, John A. 1971. A $1,000 PER YEAR PER ACRE CROP? N. Nut Growers Ass. Annu. Rep. 61: 123-133.

Intensive early care is essential, but growth rate of pole-size and small sawtimber walnuts on good sites in central Indiana suggests that 22-inch veneer timber can be produced on a 60-year rotation.

132. Moslemi, Ali A. 1967. QUANTITATIVE COLOR MEASUREMENT FOR BLACK WALNUT WOOD. USDA Forest Serv. Res. Pap. NC-17, 16 p., illus. N. Cent. Forest Exp. Sta., St. Paul, Minn.

Black walnut (Juglans nigra L.) veneer specimens with wide variations in color were evaluated by a quantitative method of color measurement. The internationally adopted CIE system of colorimetry was used to analyze the data. These data were converted to also show them in the Munsell system. Color differences among the walnut veneer specimens were also numerically specified.

133. Nachev, P. 1965. [NEW ENEMIES OF THE PLUM CULTURE AND THE WALNUT-TREE IN BULGARIA.] Gradinarska Lozarska Nauk. 2(5): 581-587, illus. [In Bulgarian with English summary.]

Lists and illustrates five insect pests on walnut trees, and two insect parasites.

134. Naughton, Gary G. 1970. BLACK WALNUT DEFORMED BY SHOOT MOTH. J. Forest. 68(1): 28-29, illus.

On the basis of observations made in southeastern Kansas in 1967 and 1968, the cause of death of the terminal shoots of black walnut during the growing season is shown to be due in part to the larvae of Gwendolina concitatricana Heinrich. This is also a major factor in the cause of walnut seedling stem deformity.

135. Naughton, Gary G. 1970. GROWTH AND YIELD OF BLACK WALNUT PLANTATION. Kan. State Univ. Ext. Serv., Manhattan. 11 p.

Presents tables for site quality evaluation, growth and yield, crown width, spacing, and basal area, and nut yield.

136. Nedev, N. 1968. [RESULTS FROM INOCULATING THE WALNUT (JUGLANS REGIA) WITH BUDS KEPT IN VARIOUS NUTRIENT SOLUTIONS.] Gradinarska Lozarska Nauk. 5(5): 3-6, illus. [In Bulgarian with French summary.]

Not seen.

137. Nedev, N. 1969. [STUDIES ON THE DURATION OF THE STAGES OF UNION IN WALNUT BUDDING.] Gradinarska Lozarska Nauk. 6(2): 3-9, illus. [In Bulgarian with Russian and French summaries.]

In buds grafted on 5, 15, and 25 August the callus began to form on the rootstock in 5 days, whereas in those budded on 5 and 15 September it took 10 days. The isolation layer, in the first few days a deep brown line, began to be reabsorbed in some places after 20 to 30 days, and had disappeared 40 to 45 days after budding. Vascular elements began to form 20 to 25 days after budding; the differentiation of the scar tissue was most active close to the two sides of the bud shield, and the vascular tissue differentiated more slowly inside the callus. Medullary rays started to join up 30 to 40 days after budding, and complete union was obtained in 60 to 65 days.

138. Nelson, N. D., Maeglin, R. R., and Wahlgren, H. E. 1969. RELATIONSHIP OF BLACK WALNUT WOOD COLOR TO SOIL PROPERTIES AND SITE. Wood and Fiber 1(1): 29-37.

Larger differences were found between black walnut trees in heartwood luminance (lightness) than in dominant wavelength (hue) or purity. Indiana-grown walnut heartwood had higher luminance than Missouri-grown walnut. The relationship of heartwood color to soil properties was greater than it was either to tree age or to diameter-growth rate.

139. Newbold, Ray A. 1967. THE COLLECTION AND STRATIFICATION OF BLACK WALNUT SEED. M.S. thesis, South. Ill. Univ. 72 p.

Seed was collected from five trees in Jackson Co., Illinois, between August 26, 1966, and February 23, 1967. Seed collected between November 5 and November 18 germinated best. Stratification at fluctuating temperatures for 60 days or more produced better germination than constant temperature stratification. Maximum germination was achieved by stratification for 120 days with temperature alternated daily between 37° and 52° F.

140. Oprea, C. 1967. [DATA ON THE BIOLOGY OF WALNUT POLLEN.] Lucrari Stiint., Inst. Agron. N. Balcescu, Ser. B, 10: 253-263. [In Rumanian.]
The length of walnut (Juglans regia?) catkins was found to vary with the sex of the tree. The number of flowers was directly proportional to the length of the catkin, which was not shed until the last flower had opened. The pollen could germinate in concentrations of sugar ranging from 5 to 25 percent, but tube elongation was greatest in the 10 to 20 percent range. Viability lasted for 100 hours at 14° to 15° C., but only for 55 hours at 22° to 25° and 0°. Temperatures >25 percent and humidity <30 percent during pollen maturation caused sterility.

141. O'Rourke, F. L. S. 1967. PRESENT STATUS OF THE CARPATHIAN WALNUT IN NORTH AMERICA. Amer. Nurseryman 125(3): 15, 127-129, illus.
Discusses the distribution and low temperature responses of Juglans regia with notes on the 10 main varieties.

142. Ozol, A., and Zukovska, Z. 1953. [PROSPECTS FOR THE CULTIVATION OF JUGLANS REGIA AND OTHER SPECIES OF WALNUT IN THE LATVIAN SSR.] Sborn. Trud. Inst. Biol. Akad. Nauk Latviiskoi SSR, Vol. 1. [In Latvian.]
Not seen.

143. Painter, John H., and Raese, J. Thomas. 1965. MINERAL CONTENT OF WALNUT (JUGLANS REGIA L.) HULLS, SHELLS, AND KERNELS. Amer. Soc. Hort. Sci. Proc. 87: 226-228.
Hulls, shells, and kernels of Persian walnuts from eight locations in Oregon were analyzed to determine mineral composition. Ovendry hulls contained on the average the following percentages: 9.6 K, 0.8 N, 0.08 P, 0.5 Ca, and 0.1 Mg. Ovendry kernels contained 3.2 N, 0.4 P, 0.5 K, 0.07 Ca, and 0.2 Mg. Ovendry shells contained 0.2 N, 0.01 P, 0.4 K, 0.2 Ca, and 0.03 Mg.

144. Panfilova, T. S. 1940. [FUNGAL DISEASES OF WALNUT FORESTS IN SOUTHERN KIRGHIZIA.] In Sbornik "Gretskii orekh Yuzhnoi Kirgizii." Vses. Nauch.-Issled. Inst. Sukhikh Subtrop. [In Russian.]
Not seen.

145. Park, Kyo Soo. 1967. [NEW METHOD OF JUVENILE TISSUE GRAFTING OF SOME SPECIAL-USE-TREES. I. STUDIES ON THE JUVENILE TISSUE GRAFTING OF SOME CROP-TREE SPECIES (WALNUT, CHESTNUT, AND OAK).] Inst. Forest Genetics (Korea) Res. Rep. 5: 75-84, illus. [In Korean with English summary.]
Juvenile-tissue grafting of Juglans mandshurica and other walnuts was 60 to 100 percent successful using newly elongated shoots from either germinated seed or older plants as both scion and stock. New shoots are at about the right stage for grafting when they bear four ordinary leaves.

146. **Perevertajlo**, B. I. 1969. [ROOT SYSTEM OF JUGLANS NIGRA IN YOUNG PLANTATIONS.] Lesn. Z., Arhangel'sk 12(2): 151-154, illus. [In Russian.]
In 7-year-old black walnut plantations grown at 2 by 6 m. spacing, the depth of branching of the taproot was 23 cm. Height averaged 5.2 m., and diameter 7.9 cm. When grown in mixture with ash at 2 by 1-1/2 m. spacing, walnut height was reduced to 4.6 m. and diameter to 5.7 cm.; when mixed with maple, walnut height and diameter were virtually unchanged. In the walnut-ash plantation, the ash overtopped the walnut trees causing the walnut crowns to be deformed, although their stems were straight. When mixed with maple, the walnut crowns generally completely overtopped the maple. The fine roots of the 7-year-old walnut trees extended to a depth of 100 cm. but are most common between 10 and 20 cm., with lesser concentrations between 0 to 10 and 20 to 30 cm. In contrast, roots of herbaceous plants in walnut plantations did not extend below 30 cm. and were primarily concentrated between 0 to 20 cm.

147. Perry, S. F. 1967. INHIBITION OF RESPIRATION BY JUGLONE IN PHASEOLUS AND LYCOPERSICON. Bull. Torrey Bot. Cl. 94: 26-30.
The effect of aqueous juglone solutions on the leaf respiration of beans and tomatoes was determined. Concentrations of less than about 10^{-5} M had little or no effect. At higher concentrations the percentage inhibition increased more or less linearly with the log of the juglone concentration, with a 50 percent inhibition occurring at about 10^{-4} M. The two species reacted similarly; hence, their differential reactions to walnut poisoning in the field are not due to any difference in the effect of juglone on their respiration.

148. Petrosjan, A. A. 1965. [THE BIOLOGICAL

CHARACTERISTICS OF FLOWERING AND POLLINCATION IN WALNUTS AND PROBLEMS IN THE DEVELOPMENT OF NATIVE VARIETIES OF THIS CROP.] Agrobiologija 4: 569-571. [In Russian.]

Studies on the floral biology of walnuts showed that normal trees bore seven to eight times more male than female flowers. However, self-pollination was not satisfactory when the two types of flowers did not open at the same time. Describes methods of estimating the self-fertility of individual trees by (1) observing the phenological phases of the male and female flowers over a 3-year period, and (2) by observing the percentage fruit set on branches bearing both male and female flowers that are isolated in sealed paper containers through which foreign pollen cannot penetrate. Trees showing a percentage fruit set of 70 percent or more were regarded as self-fertile.

149. Petrosjan, A. A., and Antonenko, G. A. 1968. [WINTER HARDINESS IN WALNUT TREES.] Sadovodstvo (Horticulture) 10: 28-29. [In Russian.]

Of eight ecotypes subjected to a warm autumn and winter followed by sudden frost of -20° to -22° C. at Krasnodar, the hardiest were those from the plain of the Kuban', the steppe around Ejsk, the Central area of Stavropal' territory, the vicinity of Krasnodar and the Bostandyk district of Uzbekistan. All ecotypes varied in the extent of the damage to individual trees, this being attributed to heterozygosity and the segregation of different cold-resistance types.

150. Phares, Robert E. [n.d. Circa 1970]. THE NURSERYMAN'S ROLE IN THE CULTURE OF BLACK WALNUT. Northeast. Area Nurserymen's Conf. Proc., Carbondale, Illinois, Aug. 20-21, 1969: 59-65.

Nurserymen can help landowners achieve better planting success by producing larger seedlings, avoiding seedling damage during lifting and shipping, and maintaining better control over where seed is collected and where seedlings from a given seed source are shipped.

151. Polishchuk, L. K., Dibrova, L. S., Zablotskaya, K. M., and Lapchik, V. F. 1968. [THE SIGNIFICANCE OF OXIDATION-REDUCTION PROCESSES IN PLANT FROST RESISTANCE.] Rost. Ustoichivost'Rast. 4: 122-129. [In Russian.]

Not seen.

152. Posenkov, A. K., and Rihter, A. A. 1965. [BREEDING WALNUTS FOR FROST-HARDINESS UNDER CRIMEAN CONDITIONS.] Agrobiologija 4: 562-568, illus. [In Russian.]

Selection and crossing late-flowering walnut varieties with pecans.

153. Prutenskii, D. I., and Ryk-Bogdaniko, M. G. 1940. [PESTS OF WALNUT FRUIT FORESTS OF SOUTHERN KIRGHIZIA.] In Sborn. "Gretskii orekh Yuzhnoi Kirgizii," Vses. Nauch.-Issled. Inst. Sukhikh Subtrop. [In Russian.]

Not seen.

154. Quigley, Kenneth L., and Lindmark, Ronald D. 1966. TIMBER RESOURCES. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 6-12.

Gives the extent of the black walnut resource and its growth characteristics, and an assessment of the present and anticipated drain on the resource.

155. Quigley, Kenneth L., and Lindmark, Ronald D. 1967. A LOOK AT BLACK WALNUT TIMBER RESOURCES AND INDUSTRIES. USDA Forest Serv. Res. Bull. NE-4, 28 p., illus. Northeast. Forest Exp. Sta., Upper Darby, Penn.

Shows that current annual cut of all grades of walnut timber is slightly less than the growth accruing annually on commercial forest land. However, the annual cut of high-quality material exceeds the annual growth by almost 50 percent. The outlook for high-quality walnut timber in sufficient quantity to supply the current and increasing demand is not promising. Both growth and cut in future years must inevitably be lower until new management efforts begin to show results.

156. Rambo, Richard W. 1966. TECHNIQUES OF STOCK PRODUCTION. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 13-15.

Lists the main nursery operations for growing black walnuts in the Indiana State nurseries.

157. Ramina, A. 1969. [STUDIES OF THE FLORAL BIOLOGY AND FRUITING OF WALNUTS (JUGLANS REGIA). 2. FLOWER BUD DIFFERENTIATION.] Riv. Ortoflorofruttic. 53: 480-489, illus. [In Italian with English summary.]

Buds of the walnut variety Sorrento were examined from the spring of 1967 to the autumn of 1968 at 10-day intervals. Branches were defoliated at 10-day intervals from April through October 1967. The differentiation of male flower buds was first detected 35 to 45 days after bud burst. Female buds began to differentiate 125 to 135 days after bud burst. All the floral organs were differentiated before winter dormancy began, and the formation of pollen grains and embryo sacs occurred in the following spring.

The differentiation of buds remained reversible for 25 to 35 days for males and 115 to 125 days for female buds.

158. Randall, Charles Edgar. 1967. BLACK WALNUT--OUR VANISHING MONEY TREE. Amer. Forests 73(10): 14-17, 38-40, illus.
Discusses numerous uses of walnut wood and nuts and encourages planting to meet increased domestic and foreign demand.

159. Rastvorova, O. G. 1966. [THE WATER REGIME IN SOILS BENEATH PLANTATIONS OF CERTAIN WOOD SPECIES IN THE FOREST-STEPPE ZONE.] Vestnik Leningr. Univ., Leningrad (Serija Biologii) 15(3): 135-146. [In Russian.]
Describes a study of soil moisture under 25-year pure crops of Quercus robur, Larix sibirica, Phellodendron amurense and Juglans mandshurica in Belgorod province, USSR. Although P. amurense and J. mandshurica are biologically less drought-resistant than Q. robur, their earlier leaf fall and smaller accumulation of litter permit greater infiltration of rainfall; in practice they withstand drought as well as oak, provided they are planted in pure stands or in broad belts.

160. Ruckij, I. A., and Nikolaev, E. A. 1969. [DEFOLIATION OF WALNUT SEEDLINGS WITH POTASSIUM IODIDE.] Himija sel'. Hoz. 7(9): 56-57.
Potassium iodide at 0.25 percent effectively defoliated 2-year-old walnut seedlings, increased their winter hardiness, and improved subsequent shoot growth. A 1 to 10 percent KI caused rapid leaf fall but reduced winter hardiness and shoot growth and delayed bud break.

161. Russell, T. E. 1968. TESTS OF REPELLENTS FOR DIRECT-SEEDING BLACK WALNUTS IN TENNESSEE. USDA Forest Serv., Res. Note SO-73, 4 p. South. Forest Exp. Sta., New Orleans, Louisiana.
Arasan-endrin provided fair protection for direct-seeded black walnuts on forested sites of the Cumberland Plateau.

162. Sander, Ivan L. 1966. NATURAL REPRODUCTION. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 18-19.
Describes natural reproduction as related to (1) effect of cutting method, (2) seed source, (3) height growth, and (4) management implications.

163. Sartori, Elvino. 1967. THE USE OF JUGLANS AUSTRALIS IN ARGENTINA AS A ROOTSTOCK FOR ENGLISH WALNUT (JUGLANS REGIA). Plant Propagator 13(1): 4-7.
Juglans regia was budded onto 1-year-old J. australis seedlings using T-budding and patch budding; results were all negative. Two years later, part of these seedling rootstocks were again budded on primary branches while others were grafted, putting the scions directly onto the trunk. About 50 trees were topworked by each method. Patch budding was done at the end of February (late summer), while grafting was done in October (spring). Both methods gave excellent results in this trial.

164. Schaad, Norman W., and Wilson, E. E. 1970. STRUCTURE AND SEASONAL DEVELOPMENT OF SECONDARY PHLOEM OF JUGLANS REGIA. Can. J. Bot. 48(6): 1049-1053, illus.
In Persian walnut, a small (0.5 mm.) amount of secondary phloem is functional for only one season and a large amount is nonfunctional. In 1968 in Central California the cycle of phloem development began in late February and ended sometime before mid-October. The phloem annual ring was composed of distinctive tangential bands, allowing easy distinction of seasonal growth increments. Early-season phloem, composed principally of large sieve tubes, was separated from late-season phloem by a band of fibers. The late-season phloem was composed of a mixture of narrow sieve tubes, parenchyma cells, and occasionally an incomplete tangential band of fibers.

165. Schaad, Norman W., and Wilson, E. E. 1970. PATHOLOGICAL ANATOMY OF THE BACTERIAL PHLOEM CANKER DISEASE OF JUGLANS REGIA. Can. J. Bot. 48(6): 1055-1060, illus.
Erwinia rubrifaciens Wilson, Zeitoun, and Fredrickson invades sieve tubes and parenchyma cells of the nonfunctional secondary phloem of Persian walnut, Juglans regia L. Because the sieve plate pores are great enough in diameter to allow passage of the bacteria, the nonfunctional phloem system provides an avenue along which the bacteria move long distances up and down the bark. Functional phloem, on the other hand, does not exhibit symptoms of the disease nor is it found to contain the bacteria. Although the bacteria invade the ray parenchyma and move radially through these elements to the outer xylem, bacteria are not found to enter the xylem vessels. Pressure from wound callus induces vertical cracks in the bark. A slimy substance containing the bacteria exudes through the cracks to the bark surface, thereby allowing dispersion of the bacteria.

166. Schanderl, H. 1965. [FLOWER BIOLOGY AND SEED FORMATION IN COMMON WALNUTS AND BLACK WALNUTS.] ErwObstb. 7: 149-154, illus. [In German.]

Parthenogenesis was strongly marked in 12 of the 38 European walnut types investigated. Fruit set and the degree of parthenogenesis were directly related. In Juglans nigra, however, a large proportion of the unfertilized ovules aborted, giving empty fruits. Walnut pollen grains contain sucrose and germinate without liquid in a saturated atmosphere, the tube being coated with an oily secretion.

167. Schneider, G. 1969. BIOMASS AND MACRONUTRIENT CONTENT IN A 31-YEAR-OLD BLACK WALNUT PLANTATION. Mich. Acad. 11(4): 33-42.

Reports fresh and dry weight, percent moisture, and amounts of five macronutrients for the above-ground portions in a 31-year-old black walnut plantation in southwestern Michigan. Dry weight in a representative tree is 58 kg., 66 percent of which is in stemwood, 12 percent in bark material, 10 percent in branches, and 5.5 percent in foliage. The macronutrient content in a representative tree is 0.94 kg. Calcium is the most abundant chemical element, followed in order by nitrogen, potassium, magnesium, and phosphorus. The stem has the greatest percent of all elements, with amounts decreasing in the following order: bark, leaves, branches, and fruit. The stem, bark, and leaves contain 82 percent of the total nutrient capital.

168. Schneider, G. 1970. MICRO-NUTRIENTS IN A 31-YEAR-OLD BLACK WALNUT PLANTATION. Mich. State Univ. Agr. Exp. Sta. Res. Bull. 29, 8 p.

Reports amounts and distribution of six micronutrients and sodium for the above-ground portions of a 31-year-old black walnut plantation in southwestern Michigan. Iron was the most abundant chemical element followed in order by sodium, aluminum, manganese, zinc, copper, and boron. The stem bark and leaves contain 75 percent of the total elemental content of the above elements.

169. Schneider, G., Khattak, Ghaus, and Bright, John. 1968. MODIFYING SITE FOR THE ESTABLISHMENT OF BLACK WALNUT. N. Amer. Forest Soils Conf. 3: 155-169.

Black walnut seedlings planted on level, wind-swept, open-field sites had less vigorous growth, smaller leaf area, and incurred greater foliage damage than those growing in either forest openings or protected open fields where similar soil conditions prevailed. Mulching and irrigation increased soil moisture, but these treatments did not compensate for lack of wind protection.

170. Segura, B. De. 1970. [RADICULAR PUTREFACTION OF WALNUT (JUGLANS SPP.) CAUSED BY PHYTOPHTHORA CINNAMOMI RANDS. IN TURRIALBA.] Turrialba 20(1): 116-118, illus. [In Spanish with English summary.]

A root disease on Juglans spp. has recently been observed at the Interamerican Institute of Agricultural Sciences, Turrialba, Costa Rica. The disease is produced by the fungus Phytophthora cinnamomi Rands. A survey made 4 months after planting indicates that the Salvador provenance (Juglans olanchana? or nigra?) is highly resistant to P. cinnamomi, whereas the provenances from Ecuador (Juglans neotropica) and Peru-Bolivia (Juglans boliviana) are very susceptible. The Nicaraguan provenance (Juglans olanchana) also shows resistance to the disease.

171. Semahanova, N. M., and Mazur, O. P. 1968. [MYCORRHIZAE OF JUGLANS REGIA AND THE CONDITIONS FOR THEIR FORMATION.] Izv. Akad. Nauk SSR (Ser. biol.) 4: 517-529. [In Russian.]

A study was made of mycorrhiza formation and the anatomy and biology of mycorrhiza development in natural conditions in central Tadzhikistan. J. regia forms endotrophic mycorrhizae of the phycomycete type, and their formation is most intensive in the layer 5 to 30 cm. from the soil surface. The penetration and spread of the mycorrhizal fungus in the host root is described, and also the fungus/host metabolism in the process of phagocytosis. Optimum development of mycorrhizae is observed at 40 to 55 percent of maximum water-holding capacity of the soil, with a moderate P supply.

172. Serr, E. F. 1962. NUTRITIONAL DEFICIENCIES AND FERTILIZATION PRACTICES IN CALIFORNIA WALNUT ORCHARDS. N. Nut Growers Ass. Annu. Rep. 52(1961): 69-74.

Nine nutritional elements have been found separately to limit walnut growth and production in at least one location in California. Only nitrogen is generally needed in regular yearly applications in all districts. Ranges of normal and deficient concentrations are given for eight elements in J. regia leaves, along with visual nutrient deficiency symptoms and recommended treatments.

173. Serr, E. F. 1965. DWARFING THE PERSIAN WALNUT BY USE OF INTERSTOCKS. N. Nut Growers Ass. Annu. Rep. 55: 106-111.

The use of Juglans nigra and J. ailantifolia cordiformis interstocks for trees of J. regia variety Hartley reduced the size of the Hartley tops by one-half after 13 seasons' growth from the time of planting the rootstocks (Paradox hybrids). Yields per unit of cross-sectional trunk area were doubled; this

was large accounted for by an increase in the number of pistillate flowers produced from lateral buds.

174. Serr, E. F. 1965. WALNUT ROOTSTOCK. Int. Plant Propagators Soc. Proc. 14: 327-329.
For grafting J. regia in California, the Paradox hybrid rootstocks are recommended over J. hindsii for four reasons: (1) greater vigor and faster growth especially in mountain districts and on poorer soils and in replant situations; (2) greater tolerance of root lesion nematodes; (3) greater tolerance of high lime content in soil, excess water, or very heavy soil texture; and (4) resistance to crown rot (Phytophthera cactorum). Among four methods of clonal propagation, rooting of hardwood cuttings is recommended to produce clonal rootstocks of the Paradox hybrid.

175. Serr, E. F. 1968. DWARFING INTERSTOCKS FOR PERSIAN WALNUTS. Plant Propagator 14(1): 10-13.
(See also 173 above.)

176. Serr, E. F., and Rizzi, A. D. 1965. WALNUT ROOTSTOCKS. Univ. Calif. Agr. Ext. Serv. Pub. AXT-120, 8 p., illus.
Discusses suitability of five Juglans species, the Paradox hybrid walnut, and Pterocarya stenoptera as rootstocks for J. regia. Disease resistance, soil limitations and effect on scion growth may all influence choice of rootstocks.

177. Shchepotiev, F. L. 1951. [ABNORMAL FRUITS OF WALNUT (JUGLANS REGIA L.).] Dokl. Akad. Nauk SSR 77: 1103-1105. [In Russian.]
Not seen.

178. Shchepotiev, F. L. 1953. [METAXENIA OF THE WALNUT.] Agrobiologija 11. [In Russian.]
Metaxenia was noted in Juglans nigra fruit when pollinated by J. regia or J. mandshurica, but not in J. regia pollinated by J. mandshurica.

179. Shchepotiev, F. L. 1954. [BISEXUAL FLOWERS OF WALNUT.] Priroda 43(3): 92-94. [In Russian.]
Not seen.

180. Shchepotiev, F. L., and Borisenko, T. T. 1949. [THE GERMINATION OF WALNUT POLLEN (JUGLANS REGIA L.) IN AN ARTIFICAL MEDIUM.] Dokl. Akad. Nauk SSR 68: 617-620. [In Russian.]
Not seen.

181. Sika, A. 1964. [RAISING JUGLANS NIGRA IN SOUTHERN MORAVIA.] Cas. Slexks. Muz., Opava (Ser. C, Dendrol.), p. 31-42. [In Czechoslovakian. German summary.]
An account of the history of its introduction and the distribution of existing stands, giving data on performance in relation to site requirements.

182. Sluss, R. R. 1967. POPULATION DYNAMICS OF THE WALNUT APHID, CHROMAPHIS JUGLANDICOLA (KALT.) IN NORTHERN CALIFORNIA. Ecology 48(1): 41-58, illus.
Populations of walnut aphids and associated insects were observed over a 4-year period in several northern California walnut orchards. Temperature, leaflet age, amount of prior aphid feeding, and coccinellid predation were found to be the most important factors influencing walnut aphid population changes. Sharp declines in aphid population levels were correlated with high temperatures, especially when several days occurred with maxima over 100° F. Temperatures may also affect aphids indirectly by directly affecting coccinellid beetles.

183. Sokolov, S. Ya. 1949. [WALNUT OF SOUTHERN KIRGHIZIA AND THE VARIABILITY OF ITS FRUITS.] Trud. Yuzhno-Kirgizskoi Eksp. Akad. Nauk SSR, Vol. 1. [In Russian.]
Not seen.

184. Solignat, G. F., and Grente, J. 1965. RECHERCHES SUR LE NOYER ENTERPRISES PAR L'I.N.R.A. C. R. Acad. Agr. Fr. 51(8): 579-587.
A report on rootstock trials, Phytophthora infection, and frost resistance in Juglans regia grown for nut production.

185. Solignat, G., and Venot, P. 1966. [VEGETATIVE PROPAGATION OF WALNUTS.] C. R. Acad. Agr. Fr. 52: 674-677. [In French.]
When walnut rootstocks were layered and the suckers ringed and earthed up, well-rooted plants suitable for transplanting were obtained within one season (May-November). Light soil or a mixture of soil and river sand was necessary for abundant fibrous root development. Juglans sieboldiana rooted more readily than J. nigra, which in turn rooted better than J. regia. There was also a considerable difference in rooting capacity among individual plants within a species.

186. Spiegl, P., and Chirikdjian, J. J. 1969. [THE DISTRIBUTION OF FLAVONOIDS IN JUGLANS REGIA VAR. REGIA.] Pharmazie 24: 780-781. [In German.]
Includes data on the distribution of quercetin, camphorol, quercitrin, hyperoside, and other flavonoids.

187. Stoičkov, J., et al. 1967. [ON THE BEHAVIOR OF WALNUTS UNDER VARIOUS SOIL

CONDITIONS.] Grad. lozar, Nauka 4(8): 9-23. [In Bulgarian. English and Russian summaries.]

Concludes that high calcium carbonate contents, particularly in the upper soil horizons, are unfavorable to walnut growth and longevity. Dry, free-draining soils are also inimical to good growth, cropping and longevity. Other unfavorable factors are cold winds, low winter temperatures and very hot dry weather.

188. Stone, Donald E., Reich, Julianne, and Whitfield, Sylvia. 1964. FINE STRUCTURE OF THE WALLS OF JUGLANS AND CARYA POLLEN. Pollen et Spores 6(2): 379-392.

Contains other new references.

189. Švidenko, A. I. 1970. [FROST-CRACK DAMAGE TO JUGLANS REGIA IN THE BUKOVINA REGION (UKRAINE).] Lesoved., Moskva 1: 89-90. [In Russian. English summary.]

A survey of frost-crack damage showed that the number of stems affected ranged from 1.1 to 83.4 percent. Stands on fairly moist oak sites on south slopes suffered most. There appears to be scope for selection of resistant individuals.

190. Tyškevič, G. L., and Žadan, V. M. 1969. [WAYS OF INCREASING THE YIELD OF JUGLANS REGIA PLANTATIONS IN MOLDAVIA.] Lesn. Hoz. 22(7): 18-22. [In Russian.]

In recent years in Soviet Moldavia, ca. 8,600 ha. of mixed forest plantations have been established in which J. regia (grown primarily for timber) forms 12 to 25 percent of the number of trees. These plantations are proving unsatisfactory, and (on the basis of trials here described) recommendations are made for intensive cleaning and thinning to convert them into high yielding pure J. regia stands.

191. Van Den Bosch, Robert. 1970. TRIOXYS PALLIDUS...AN EFFECTIVE NEW WALNUT APHID PARASITE FROM IRAN. Calif. Agr. 24(11): 8-10.

A parasitic wasp has been effective in controlling the walnut aphid, Chromaphis juglandicola, in California. One wasp strain from France has been established in the southern part of the State; an Iranian strain is better adapted to the more severe climate of central California.

192. Veresin, M. M., and Ulyukina, M. K. 1967. IMPROVEMENT OF WINTER HARDINESS IN WALNUT BY SELECTION AND HYBRIDIZATION AT THE EDUCATIONAL-EXPERIMENTAL LESKHOZ OF THE VORONEZH FORESTRY INSTITUTE. In Conf. on Forest-Tree Genet., Selection, and Seed Prod. (Edited by G. M. Kozubov, et al.) Clearinghouse for Fed. Sci. & Tech. Inform., Springfield, Va., TT 69-55067, p. 62-64.

Early tests of hybrids.

193. Vinogrudov, N. P. 1967. [FOR HIGH YIELDS OF WALNUT IN KIRGIZIA.] Les. Hoz. 4: 34-38. [In Russian.]

In the "forest orchards" (natural stands used as orchards) of Kirgizia, 200 valuable trees for use in seed nurseries were located. Eight other biotypes have been propagated vegetatively and are currently undergoing trials.

194. Vogel, A., Jr., and Reischauer, C. 1856. [A NEW ORGANIC CONSTITUENT IN THE PERICARP OF JUGLANS REGIA.] Neues Repertorium Für die Pharmacie 5: 106-110.

Not seen.

195. White, Donald P., Schneider, G., and Lemmien, Walter. 1970. HARDWOOD PLANTATION ESTABLISHMENT USING CONTAINER GROWN STOCK. USDA Forest Serv. Tree Planters' Notes 21(2): 20-25, illus.

Three species of hardwoods, black walnut, black cherry, and red oak, were grown in a variety of container systems for 3 weeks and then field planted. Best early growth and subsequent field response was obtained in a 10-inch long cylinder of plastic mesh containing a stack of expanded peat pellets.

196. Whitson, John, John, Robert, and Williams, Henry Smith, eds. 1915. THE PRODUCTION OF A QUICK-GROWING WALNUT. In Luther Burbank--his methods and discoveries and their practical application. 11: 193-237, illus. New York and London: Luther Burbank Press.

197. Williams, Robert D. 1966. PLANTING STOCK GRADES. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 16-17, illus.

Recommends planting seedlings of 7/32-inch or larger on cleared forest sites and strip-mined banks.

198. Williams, Robert D. [n.d. Circa 1970]. IMPORTANCE OF SEEDLING SIZE FOR SURVIVAL AND GROWTH. Northeast. Area Nurserymen's Conf. Proc., Carbondale, Ill., Aug. 20-21, 1969: 30-36, illus.

Black walnut seedlings 8/32-inch diameter and larger survived and grew better than smaller ones on cleared forest sites, strip-mined sites, and cultivated old-field sites. The superiority of the large seedlings was most evident on the poorer sites.

199. Williams, Robert D. 1970. PLANTING

LARGE BLACK WALNUT SEEDLINGS ON CULTIVATED SITES. USDA Forest Serv. Tree Planters' Notes 21(2): 13-14, illus.

Planting 10/32- and 12/32-inch seedlings resulted in the best survival (98 percent) at the end of 2 years, while 4/32-inch seedlings showed the poorest survival. Seedlings 8/32-inch and larger in diameter grew faster than smaller seedlings and were taller at the end of the experiment. Recommends planting healthy seedlings 8/32-inch and larger in diameter for best results.

200. Wilson, E. E., Zeitoun, F. M., and Fredrickson, D. L. 1967. BACTERIAL PHLOEM CANKER, A NEW DISEASE OF PERSIAN WALNUT (JUGLANS REGIA) TREES. Phytopathology 57(6): 618-621.

The disease, caused by Erwinia rubrifaciens, produces necrotic streaks in phloem, cambium, and inner xylem.

201. Witt, A. W. 1938. A SURVEY OF THE INVESTIGATIONS ON THE PROPAGATION AND TESTING OF WALNUTS AT THE EAST MALLING RESEARCH STATION. E. Malling Res. Sta. Ann. Rep. p. 259-265, illus.

Describes characteristics of several Juglans species used as rootstocks for J. regia. Pinching the tip of strong shoots can stimulate flower bud formation in J. regia.

202. Wood, Milo N. 1932. DICHOGAMY--AN IMPORTANT FACTOR AFFECTING PRODUCTION IN THE PERSIAN WALNUT. Amer. Soc. Hort. Sci. Proc. 29: 160-163.

All Juglans regia varieties tested are both inter-fertile and self-fertile; they can also be crossed with J. hindsii, J. californica, and J. sieboldiana. Dichogamy is stronger in young trees than older ones. Warm weather during the flowering season stimulates staminate (catkin) development more than pistillate flowering.

203. Wright, Jonathan W. 1966. BREEDING BETTER TIMBER VARIETIES. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 53-57.

Improvement work needs to be planned on a long-term, many-generation basis. Discusses breeding better walnuts as approached from (1) species hybridization, (2) provenance testing, (3) selective breeding, and (4) polyploidy and mutation breeding.

204. Wylie, John E. 1966. NUTS AND WOOD--DUAL CROPS FOR MANAGEMENT. In Black walnut culture. USDA Forest Serv., N. Cent. Forest Exp. Sta., St. Paul, Minn. p. 91-94, illus.

Walnut can be grown intensively for dual crops to economic advantage whenever there are steady markets for the nuts or such markets can be developed.

205. Yasnykova, O. O., and Tolmachov, I. M. 1967. [TRANSFORMATION OF STORED SUBSTANCES IN JUGLANS DURING THE FALL AND WINTER.] Visn. Sil's'kohospod. Nauk. 1: 68-71. [In Ukranian with Russian summary.]

Not seen.

206. Zaharik, D. A. 1966. [ACCELERATED PRODUCTION OF JUGLANS MANDSHURICA [PLANTING STOCK].] Les. Hoz. 19(2): 47-48. [In Russian.]

In trials made in 1959-1962 in Belorussia, field germination of seeds sown while still unripe (immediately after collection in August) was 3 to 21 percent greater than that of seeds collected in September-October, and 52 to 57 percent greater than that of seeds stratified for 198 to 210 days. It is concluded that all pretreatment of seed can be eliminated, and the delay involved in raising planting stock thus reduced.

207. Zarger, T. G., Farmer, R. E., Jr., and Taft, K. A. 1970. NATURAL VARIATION IN SEED CHARACTERISTICS AND SEED YIELD OF BLACK WALNUT IN THE TENNESSEE VALLEY. S. Conf. on Forest Tree Improv. Proc. 10: 34-40.

Seed yields and seed characteristics of individual black walnut trees vary widely in the Tennessee Valley; much of this variation is attributable to individual tree differences unrelated to tree size or geographic location. This variation pattern, which is also evident in oaks, suggests that seed yield may be under fairly strong genetic control and thus subject to effective field selection.

208. Zatykó, J. M. 1967. [VEGETATIVE PROPAGATION OF THE WALNUT VARIETY FERTÖDI E. I. BY WAY OF ROOTING.] Acta agron. hung. 16: 297-302, illus. [In Hungarian.]

The split-stem method of propagation, which has previously been confined to walnut seedlings, was attempted on the scions of grafted plants. The roots of grafted plants were severed on one side, the plants were laid on their sides and the new shoots that developed from the horizontal stems were gradually earthed up and etiolated. The etiolated shoots, at least 15 mm. thick, were split and wedged in September or May. Two types of soil with good and poor water-holding capacity were compared; far more shoots developed and rooted in the moister, less sandy soil.

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